WIRE AND WIRE PRODUCTS

JULY 1942

TO THE FAMOUS 400

Au revoir, but not goodby!

WIRE went into many of the four hundred metal products now placed on the "stop" list—plenty of wire, and a lot of it produced in great variety by Vaughn Motoblocs and Motoblox.

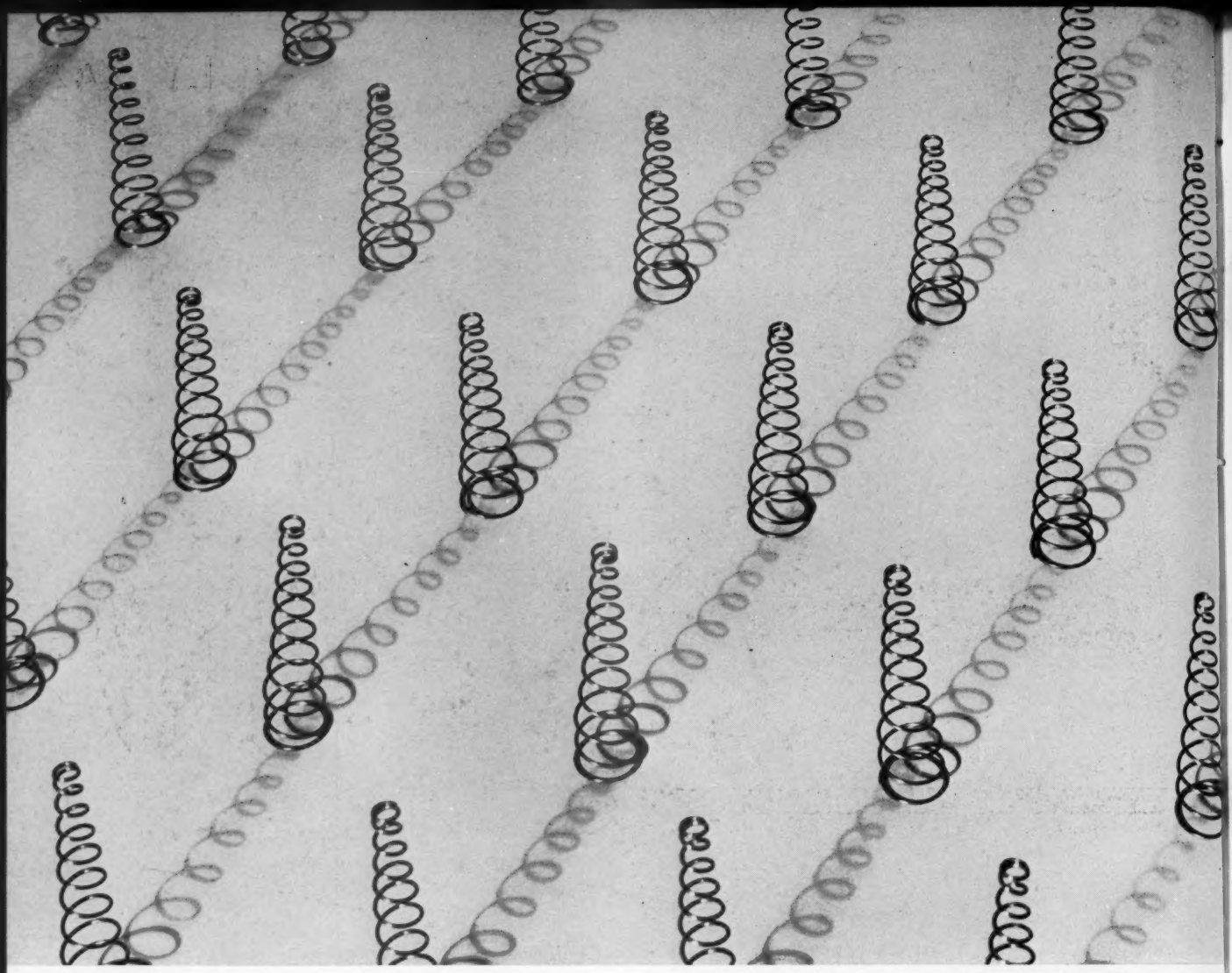
That production called for the outstanding *adaptability* of Vaughn Wire Drawing Machinery—but now those machines turn completely to the long, hard runs of war, where they join in *speed* and *stamina* the ranks of Vaughn equipment devoted 100% to the fighting needs of our country.

After Victory is won, Vaughn *flexibility* will shine again—the adaptable master of thrice four hundred wire applications in the peacetime years to come.

Vaughn WIRE DRAWING MACHINERY

THE VAUGHN MACHINERY COMPANY · CUYAHOGA FALLS, OHIO, U.S.A.

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION



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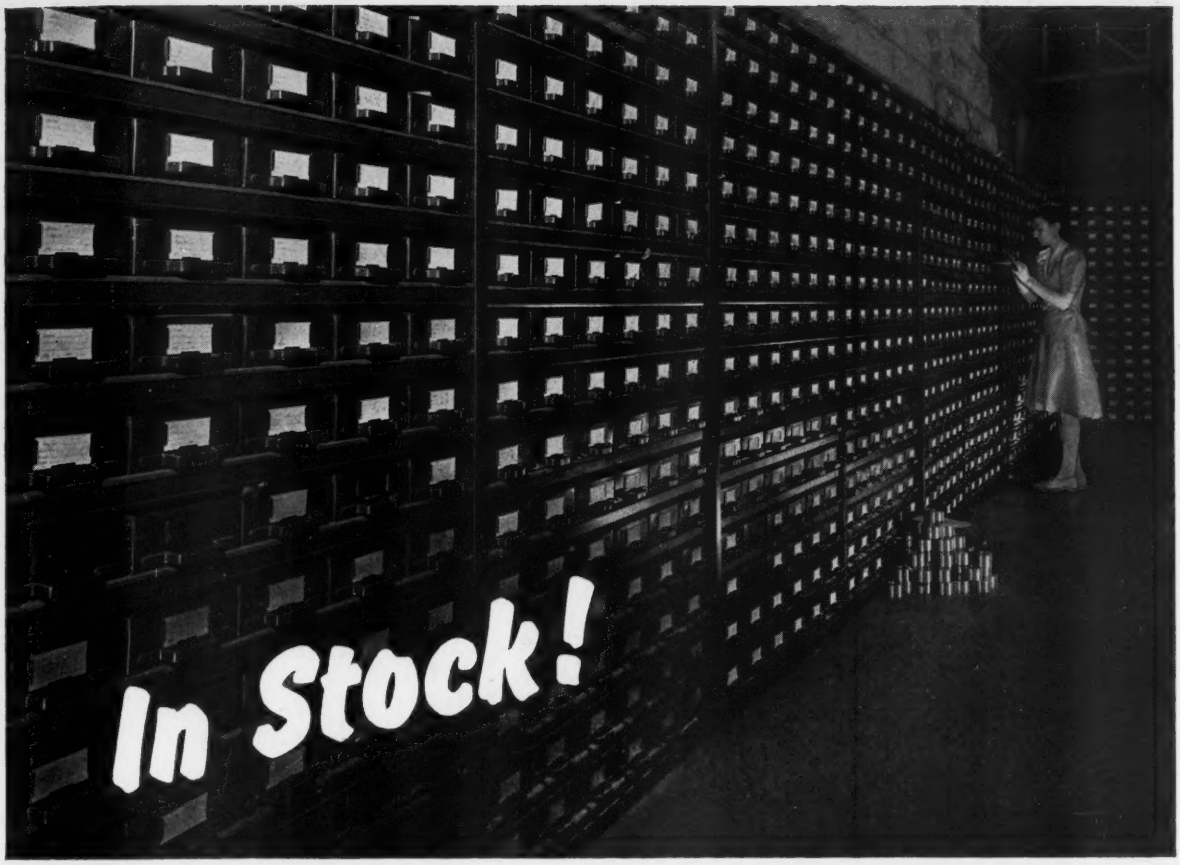

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To quickly and efficiently meet your war-time needs for round hole wire drawing, square and hexagon, Carboloy standard nibs and dies, Carboloy Company maintains an ample stock at its main plant in Detroit, with supplementary round hole cored die stocks at Chicago, Pittsburgh and Thomaston, Connecticut in sizes based upon regional requirements.

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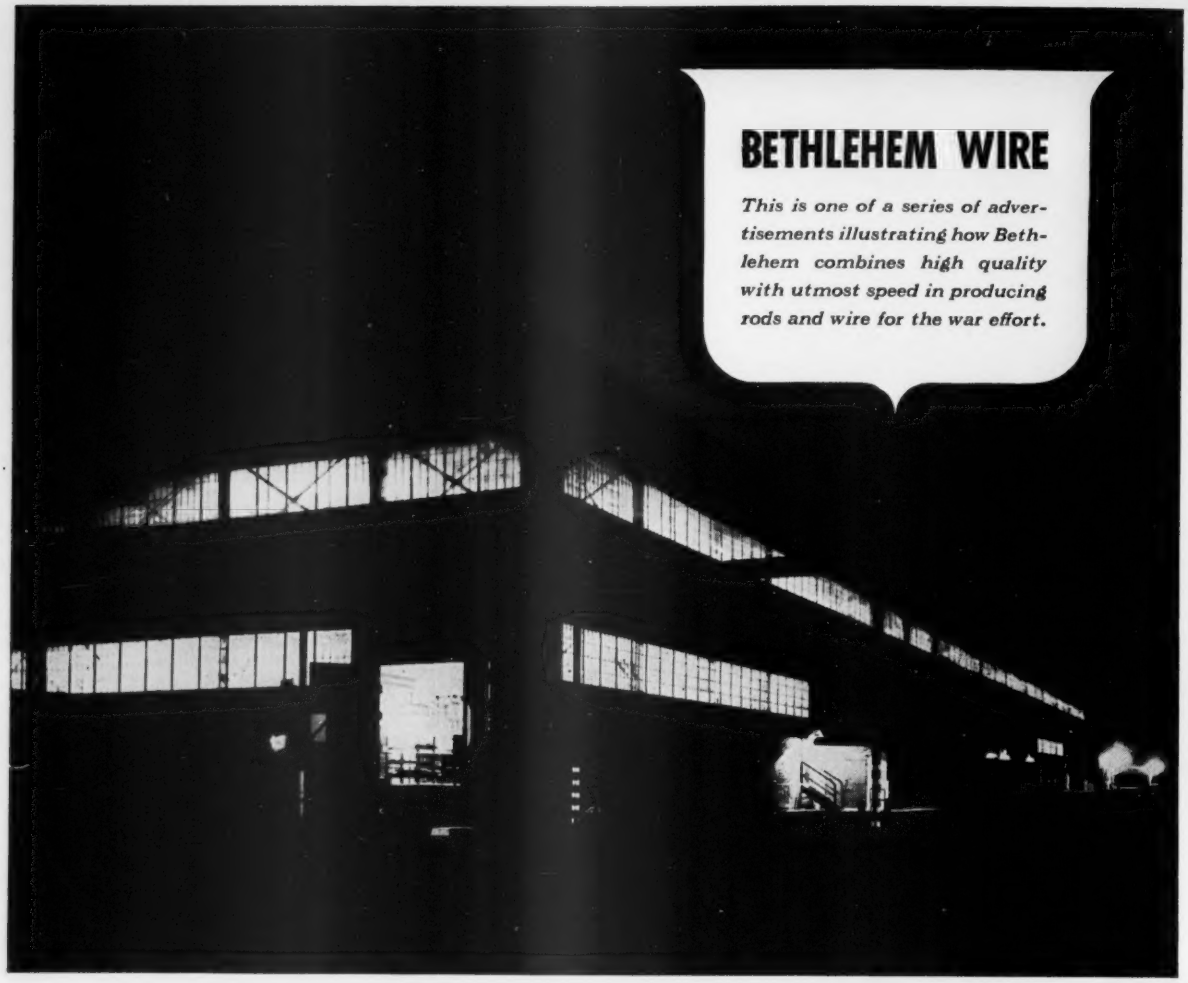
BETHLEHEM WIRE
This is one of a series of advertisements illustrating how Bethlehem combines high quality with utmost speed in producing rods and wire for the war effort.

24 hours
on rod-mill patrol

Production. That's Bethlehem's answer to the war demand. We get it in this giant Bethlehem rod mill by keeping on the move 24 hours a day.

We aren't satisfied with production alone.

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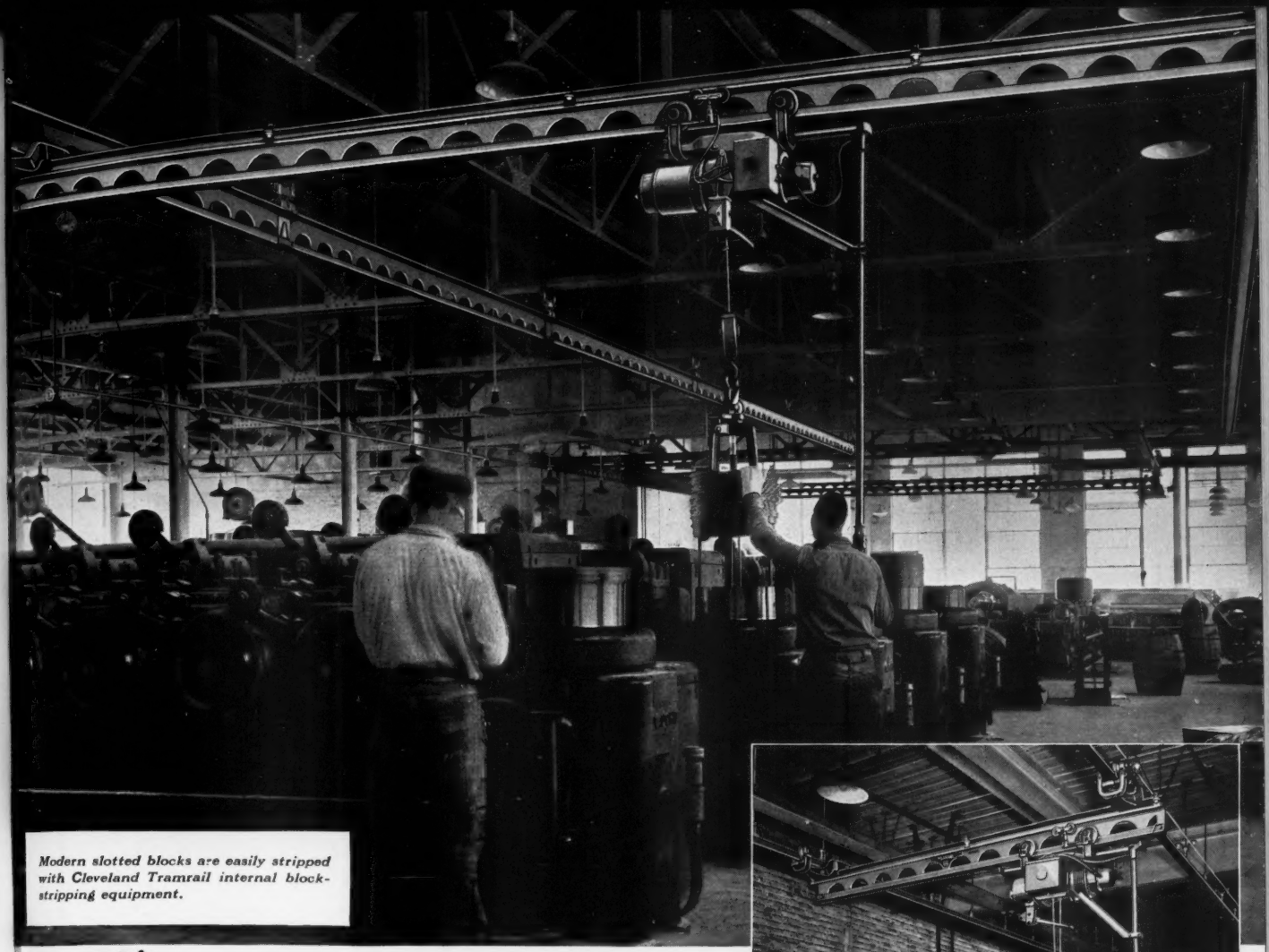
BETHLEHEM STEEL



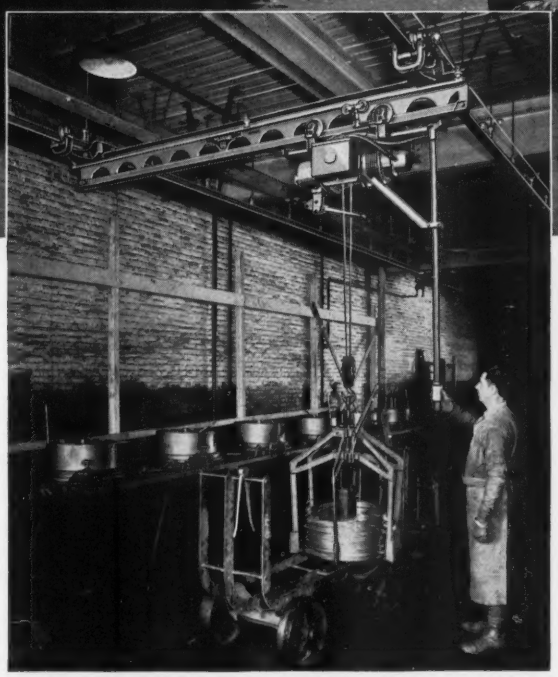
Modern slotted blocks are easily stripped with Cleveland Tramrail internal block-stripping equipment.

The FAST, EASY WAY of STRIPPING BLOCKS

With an overhead Cleveland Tramrail block-stripping crane or carrier, it's a fast, easy job to remove wire from wire-drawing blocks.

This equipment has been especially designed for the work by Cleveland Tramrail. The carriers are equipped with rigid arms for easy pushing of carrier and bridge. A push-button station is conveniently located in the lower end of the arm for instant operation of the electric hoist. If desired, the hoists may be mounted on a turn-table to serve blocks on two sides of an aisle.

For many years, Cleveland Tramrail has been the leading supplier of block-stripping cranes and carriers to the wire industry, for both internal and external stripping. Hundreds of such units are in operation.



For blocks that are not slotted a Cleveland Tramrail block-stripping crane with external stripper makes it a simple task to remove the wire.

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THE CLEVELAND CRANE & ENGINEERING CO.
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OVERHEAD MATERIALS HANDLING EQUIPMENT

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The meetings will be devoted to "brass tacks" problems — plant conversion, war production, etc. You can't afford to miss them or miss contact with men of the Wire Industry who will be there. Mill executives, production and technical men can get more out of four days of personal contacts and meetings, than would be possible in months of travel.

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You are working for Victory. Advertise in

WIRE AND WIRE PRODUCTS

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▲ ▲ ▲

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▲ ▲ ▲

If you don't already have them, rates will be sent on request.

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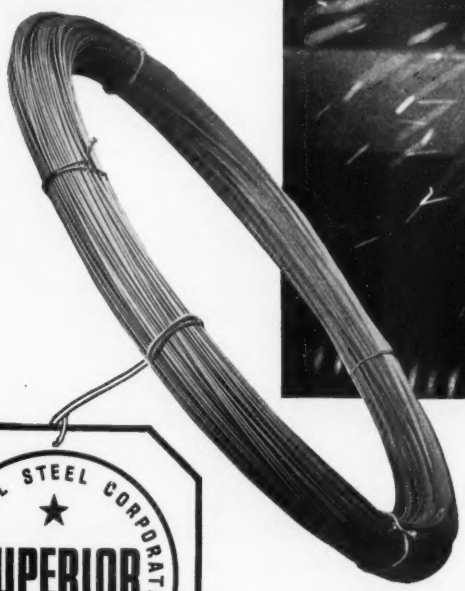
300 Main Street

STAMFORD, CONN.

Official Publication of The Wire Association

Save that Steel



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From rods to be forged into handtools, to fine 34-gauge wire for special screens, Continental SUPERIOR Wire is fitted to the requirements of particular applications in order to cut production costs and make better products.

Our present production facilities are devoted entirely to turning out Continental SUPERIOR Wire for use in tanks and planes, trucks and trains, in the factory and on the farm. The need for making every pound of this steel go as far as possible is well recognized by every manufacturer and producer of steel.

In this cause, the Continental Steel Corporation offers the services of its metallurgists and technicians. These men are prepared to work with your engineers and production men in a joint effort to effect every possible economy . . . by using a smaller gauge wire where possible, less critical analyses or finishes where practical, or perhaps by reducing spoilage.

You are invited to call upon us if you feel this service will be of benefit to you.

CONTINENTAL STEEL CORPORATION, Kokomo, Ind.

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CONTINENTAL

STEEL CORPORATION

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WIRE: Bright Basic, Annealed, KONIK, Copperad, Tinned, Special Manufacturer's, etc.

MORE • BETTER • FASTER

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In drawing, heading, and extruding operations, large tonnage to close tolerance, minimum friction and die wear, and smooth finish free of score marks — these are the highlights in the performance of Vascoloy - Ramet Tantalum - Tungsten Carbide Dies. These too, are the reasons for converting to such dies wherever high performance must be counted on for uninterrupted day-in-and-day-out production.

Tantalum-Tungsten Carbide Dies are now used for countless forming, nosing, drawing, cupping and extruding operations on articles of war materiel. Our special die department offers its services and experience to manufacturers making products requiring these operations.

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for

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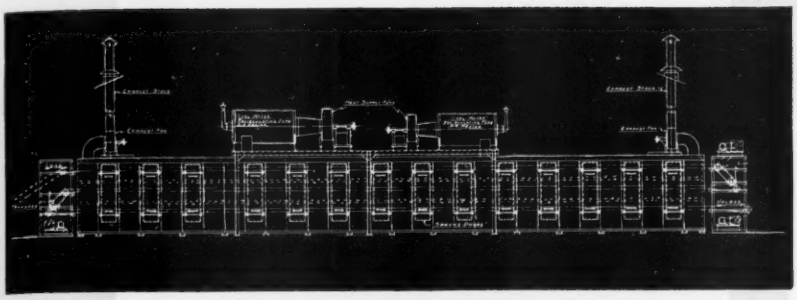

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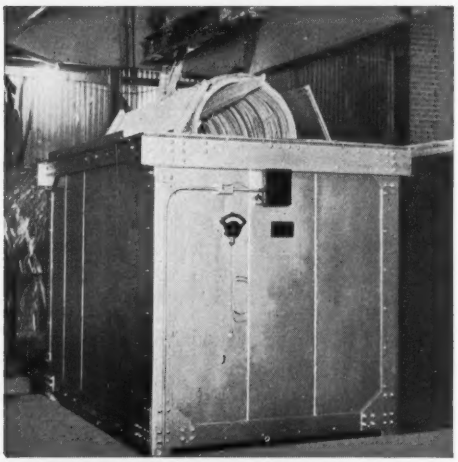

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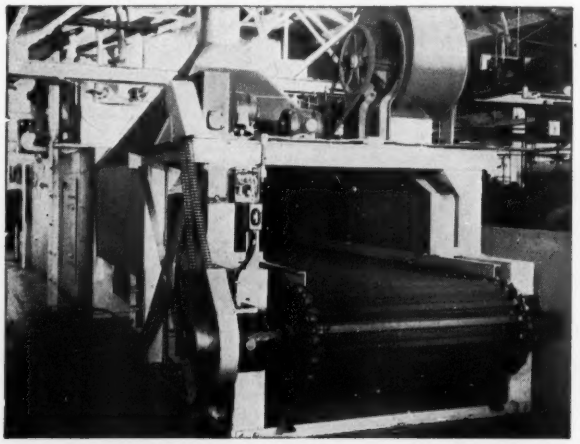

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For stress relief, drawing, tempering and heat treating.

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UPRIGHT ★ ★ ★

★ ★ ★ CONE

Wire Drawing & Machines

FOUNDED WATERBURY FARREL 1851

These high speed machines are available in several sizes and can be had with either a coiling block or spooler. The spooler may be an attachment or a separate floor-type device, such as shown. This is the No. 4 machine with belt-type cradle spooler. It is driven by a direct-coupled motor (not shown), has 13 dies and capacity for drawing copper from ¼" maximum starting size down to a finishing size of from No. 10 to No. 18 B. & S. gage. The dies and the hardened steel drawing rolls are enclosed by a rolling steel curtain to confine the splash of the drawing lubricant.

WATERBURY-FARREL
FOUNDRY & MACHINE COMPANY
Waterbury, Connecticut, U. S. A.
SALES OFFICES CHICAGO CLEVELAND NEWARK, N. J.

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FROM AN ORIGINAL DRAWING BY ORISON MACPHERSON

OPEN-HEARTH MEN SPEED PRODUCTION OF FIGHTING STEELS

These men of the open-hearth steel furnaces move into action like army engineers working under fire. Swinging their shovels in determined, fighting rhythm they heave dolomite through the flame-licked door — making "bottom" in their furnace — preparing it for another charge of molten iron and steel scrap. Within minutes the furnace roars at white heat to produce more fighting steel for ships, planes, tanks, shells, guns, bombs . . .

On the charging floor at this battery of open-hearths, workmen are making steel at a fighting pace — a pace that prevails in all departments of the works every hour of every day — speeding every ton of it on the way to help win the war. By their skill and sweat these men of steel are doing what once seemed unbelievable — getting production from their furnaces and mills greater than 100% of their rated capacity.

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W-75

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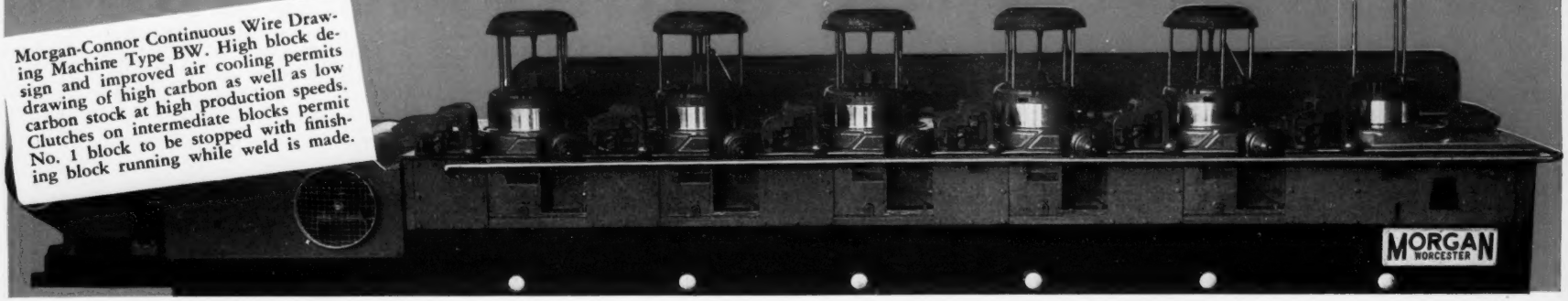
Morgan-Connor Continuous Wire Drawing Machine Type BW. High block design and improved air cooling permits drawing of high carbon as well as low carbon stock at high production speeds. Clutches on intermediate blocks permit No. 1 block to be stopped with finishing block running while weld is made.



WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable

DRAWING—ROLLING—EXTRUDING—FORMING—FABRICATING

Vol. 17 JULY, 1942 No. 7

Designated as

Official Publication By The Wire Association

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THE WIRE ASSOCIATION ANNUAL CONVENTION

AND THE

NATIONAL METAL CONGRESS AND EXPOSITION

To Be Held at

CLEVELAND, OHIO

October 12 - 16, 1942

(Not at Detroit, Michigan, as Previously Announced)

Wire Association Headquarters will be at THE CARTER HOTEL CLEVELAND OHIO

✦ ✦ ✦

Make your plans now to attend and send in your hotel reservation early as a shortage of hotel space is anticipated.

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WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
Wire Products and Insulated Wire and Cable.
DRAWING --- ROLLING --- EXTRUDING --- FORMING --- FABRICATING

Vol. 17 JULY, 1942 No. 7

The Wire Industry In War

By Colonel Frank W. Bullock,

Signal Corps, U. S. Army,
Washington, D. C.

An address delivered before the Pittsburgh Regional Meeting of The Wire Association, held at Pittsburgh, Pa., May 22nd, 1942 ✦

WAR, like the working of metal, is a very ancient, and somewhat black art. Moreover the art of war has had, from the moment one of our tree climbing or cave dwelling ancestors discovered the advantage of using a stone or a club to supplement the combat efficiency of his fists and teeth, its industrial side. But throughout the ages, the art of war has undergone few if any fundamental changes.

✦ ✦ ✦

TO defeat the enemy, to destroy his armed forces, to occupy his territory, to sieze or destroy his works, to deprive him of resources without which he cannot fight and without which his will to fight cannot survive, are strategic objectives no more and no less important today than they were when the first armed tribe set out in search of better pastures.

✦ ✦ ✦

ON the other hand, tactics, that is to say the means and methods by which the accomplishment of strategic objectives are sought, are, and to a great extent always have been more or less conditioned by the "tools", weapons or devices available at any given time and place, which fact again tends to focus our emphasis upon the industrial aspect of the art of war. This emphasis does not imply, however, that revolutionary discoveries in science or industry are invariably reflected in similar revolutionary changes in military tactics.

✦ ✦ ✦

FUNDAMENTALLY, modern tactics differ but little from those employed by the heroes of antiquity. We are told that we are now engaged in a new kind of war, but are we? Armchair strategists decant learnedly and at great length on such subjects as "War of Nerves," "Softening Up" the enemy, "Fifth Columns," "Blitzkrieg Tactics," "Infiltration" and "Pincers Movements"—as if such things were new. New? Say rather as old as time itself. When Moses sent his able Chief of Staff, Joshua, and Caleb, his equally able G-2, forth to "spy out the promised land" and learn whether the "Sons of Anak" who were reported to live there, were as formidable as their press agents claimed, they executed a perfect example of "modern" tactics. They "infiltrated" into the enemy's lines, they proved that the terrible "Sons of

***"I tell this tale which is strictly true,**
Just by way of convincing you
How very little since things were made,
Things have altered in the Building Trade.
A year ago — come the middle of March
We was buildin' flats by the Marble Arch,
When a thin young man with coal black hair
Came up to watch us working there.
Now there wasn't a trick in brick or stone
That this young man hadn't seen or known
And there wasn't a tool from trowel to maul,
But this young man could use 'em all.
Then up and spoke the "plumbyers" bold—
That was laying the pipes for the 'hot and cold'
'Since you with us have made so free
Will you kindly say what your name might be?'
And the young man kindly answered them
'It might be Lot or Methusalem, or it might be Moses—a man I hate
Whereas it is Pharaoh, surnamed "The Great".
Your glazing's new and your plumbing's strange,
But otherwise, I can see no change,
And in less than a month, if you do as I bid,
I'll l'arn you to build me a pyramid".

***Kipling—Songs from Books.**

Anak" were fictitious, they organized an effective fifth column, and when they came up and encompassed the walls of Jericho, they conducted a war of nerves which so effectively softened the enemy that the walls of Jericho fell before nothing more explosive than the blast of a ram's horn.

✦ ✦ ✦

BUT what about the mobile column and the "armored spear head" in attack — certainly that's new! Not very! When Achish, Tyrant of Gath went forth to battle against the host of Israel commanded by Saul, his flying columns were headed by "chariots with wheels of iron" and his tactics in the valley of Jezreel differed in no essential particular from the German dash to Calais in 1940. Tanks? New perhaps, but in their employment no different from the ancient "Testudo." Dive bombers, just a novel form of long range artillery of extreme mobility and high angle of fire—in employment, the catapult hurling nets of loose stones high in the air, sought, and sometimes achieved, the same results.

✦ ✦ ✦

NEVERTHELESS, tactics are conditioned by technological and industrial changes. Each successive major war is characterized by the tactical use of new and novel weapons or devices. The war for American Independence took on the pattern of the frontier conditions of terrain, time and space under which it was fought, which in turn established the superiority of aimed, sustained individual rifle fire over the British school of "musketry." Similarly, in the war between the States, the theatres of operations were extended in almost direct proportion to the application of rail transportation and the magnetic telegraph to the grim business of war, while on the seas the armored ship was the natural corollary to the displacement of sail by the power of steam. In the first world war, the machine gun, the submarine, the motor vehicle, the airplane, the telephone and radio all contributed to the complex pattern of that conflict.

✦ ✦ ✦

THE present war has up to this moment disclosed nothing novel or revolutionary. The pattern of its rapidly shifting situations illustrates only one thing clearly — the decisive advantage accruing to the militant, aggressive, prepared belligerent against a peaceful and —unfortunately—complaisant antagonist. What the "new weapon" which might change the pattern of the war may be, it is idle to speculate upon. That there in all probability will be some such device is a reasonable expectation.

✦ ✦ ✦

AS science and industry have influenced the conduct and course of military operations in war, so also has war exerted a profound influence upon the course and progress of science and industry. War is a game that is always played "for keeps." War always demands the impossible in accomplishment—and gets it. In war, the impossible becomes the commonplace and the discoveries of tomorrow are obsolete today.

✦ ✦ ✦

WE are told that there is no such thing as a good war or a bad peace. We are told that war is the antithesis of progress, that it is the reversal of the course of life from civilization to savagery, that it is the ultimate destructive force and that in war the normal advance of science, industry, the arts, culture and all the values which go toward the creation of a civilized society ceases. This generalization, like most generalizations, is true in part, but like all generalizations, including this one, it is partly false. In other words, it is probable that in the leisured contemplative atmosphere of peace, the researches of Lister, Carrell, Dakin, Maxim, and DeForest, or the industrial genius of Carnegie **might** have achieved tangible results, but it is a fact that the productive achievements of these great minds actually **did** materialize under the driving compulsion of war.

COLONEL FRANK W. BULLOCK
Signal Corps, U. S. Army

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IN common with the rest of our political, social and economic community, the Wire Industry has suffered from and responded to the impact of war. It has met both success and disaster in the characteristic American way. It has achieved the impossible, and found its greatest reward in the realization of a job well done.

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UNDER the stimulus of war the Wire Industry has taken some of its mightiest strides in technological development and productive skill. Under that stimulus, the impossible has become standard practice. Let's look at the record. In the War between the States, the efforts of the Wire Industry made it possible for the Commander of the Union forces in the field to maintain telegraphic contact with armies, corps and even divisions and brigades on a battle line over two thousand miles in length. During the first World War, thousands of tons of American wire went into the laying of the North Sea mine barrage and more thousands of tons went into the building of the "Bridge of Ships" that turned the tide of battle in 1918. Still more thousands of tons of American barbed wire rusted in the mud from end to end of the far flung battle lines of Europe and the Middle East.

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MORE intimately, from the standpoint of personal interest many of you listening—or dozing—helped make the wire with which the Signal Corps constructed 110,000 odd miles of permanent communication systems in France in 1917 and '18 and many of you struggled with — and solved — the problem of making the then new

and untried field telephone wire in quantities and at rates which were than little less than fantastic. How well you solved this problem is indicated by the fact that the A.E.F. consumed over 108,000 miles of this wire during the victory campaign of 1918, and that when hostilities ended on November 11th, you were gearing up your operations to increase your output seven fold.

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WE are now engaged in the greatest of all wars, testing as never before the issue of whether or not the fundamental principles of the American way of life shall survive. The theatre of operations in this war is the earth, the seas thereof and the air above. No living creature in this our world is exempt from the hazards of war and none can expect to avoid its impact. Now, as in the past, the war demands of us, the impossible.

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DISMISSING all considerations other than material, what is the mission of the Wire Industry? The direct requirements of the Signal Corps for wire and wire products include 700 items ranging from resistance wire of less than a thousandth of an inch in diameter to submarine cable.

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THE yearly quantities represented in these requirements are impressive, totaling approximately 200,000 tons, of which 12,000 tons are bare ferrous wire, 4,000 tons are bare non-ferrous wire, and 184,000 tons are insulated wires of all classes, including paper insulated lead covered cables.

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FIELD telephone wire type W-110-B represents a considerable portion of the total requirement for insulated wires. Expressed in terms of miles or twisted pair finished wire, plans are being considered for nearly 3,000,000 miles of twisted pair wire, which in turn means 30,000 tons of .013″ high tensile steel, and 30,000 tons of .014″ copper wire.

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TO get this tremendous quantity of wire products of all types, over 80 mills are engaged in direct contracts, and over 250 mills are working as sub-contractors supplying component materials. These plants are distributed in over 150 cities and 35 states.

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THE present load in process represents an expenditure of approximately $100,000,000 and the complete program may exceed several times this figure.

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THE response of the wire industry to these demands has been both enthusiastic and effective. A spirit of cooperation between companies and between management and Government has characterized all phases of the program. Production rates have been doubled and redoubled and are daily and hourly gaining momentum. Yet, the hardest part of the job is still before us. Do it, we can, we must, and we will, but it is certain to take 'a bit of doing'. We on the military side have a great deal to learn and little time to learn in, worse, a lot of us are

(*Please turn to Page 361*)

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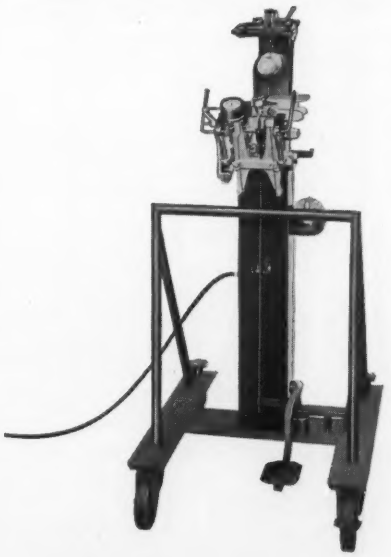

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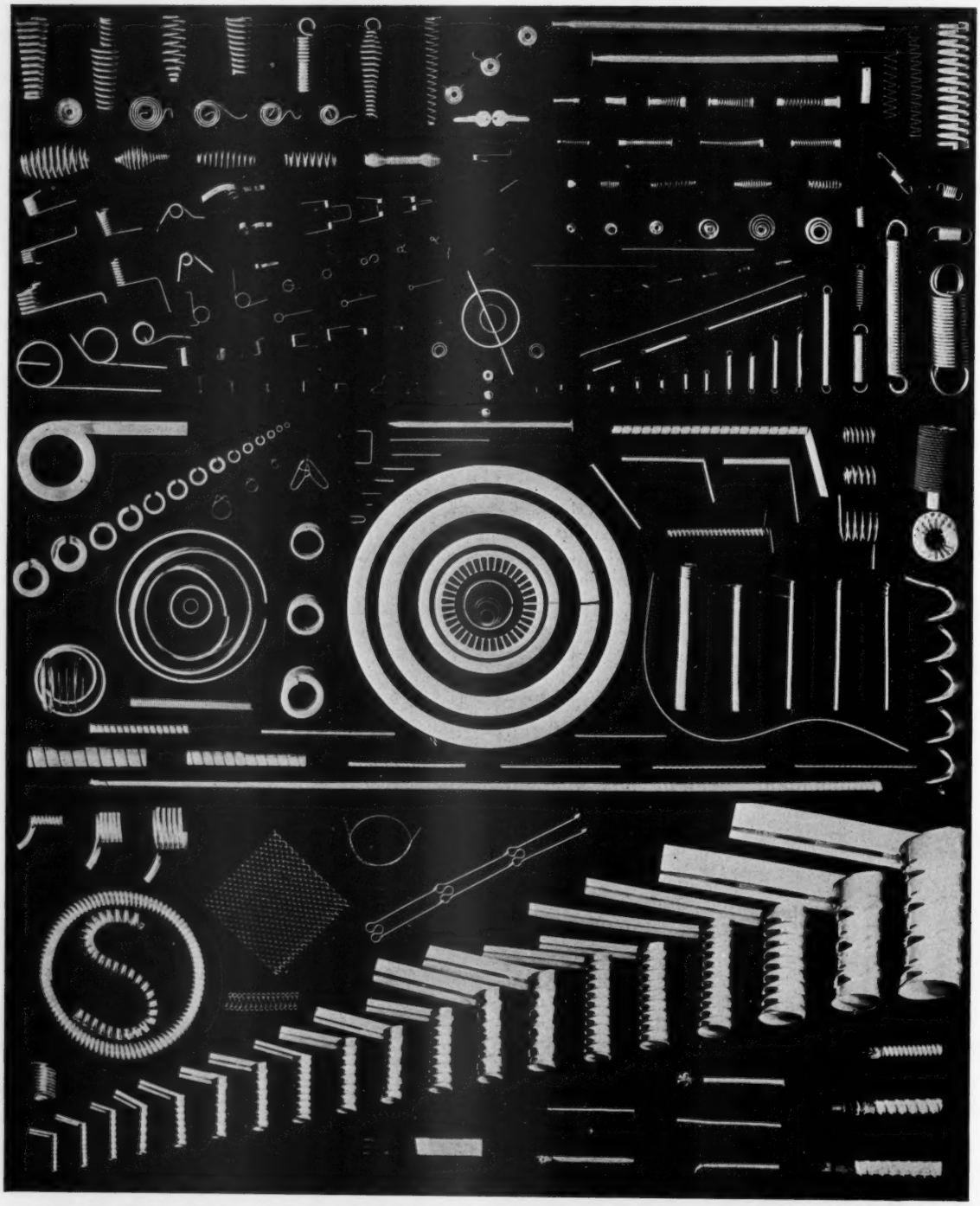

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Zinc Coating On Wire

By F. R. Morral

Assistant Professor of Metallurgy, School of Mineral Industries, Pennsylvania State College, State College, Penna.

(Published in Two Parts)

PART II

Data relating to (3) Coating, (a) Hot Galvanizing and (b) Electrogalvanizing; (4) Finishing; (5) Economics of Coating; (6) Testing and Specifications; Conclusions and Bibliography. ✦ ✦ ✦ ✦ ✦

III. Coating

THE methods of zinc coating may be classified as shown in table II according to the method of control used, and other characteristics of the processes.

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a) Hot Galvanizing

THE medium in which the coating is produced is molten spelter. The control is exercised by means of wipes. This control affects the weight of coating and the uniformity of coating. These are also controlled by the temperature of the molten spelter and by the speed of travel of the wire—more appropriately, the time of immersion of the wire in the molten spelter.

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THE control of the thickness of coating is begun in the activation step, as already mentioned, by controlling the concentration of the flux-water solution, and previously, by the degree of etching in the pickling step.

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THE wipes most used are the first three shown in table II. The largest tonnage of hot galvanized wire is asbestos wiped. Charcoal wiped wire makes possible obtaining a heavy, malleable zinc coating. If this process is used a very pure commercial zinc is used in the metal pans, the speed of the wire is usually low. The wire emerges from the molten metal, and rises vertically above the molten metal to a height appropriate to cause the adhering molten zinc to solidify. The charcoal does not appear to do any wiping, but on being above the molten metal it maintains a reducing atmosphere, and thus prevents the quick chilling of the coating on coming in contact with air, and also may prevent undue oxidization of the surface zinc. It may even help improve the uniformity of coating by the mechanical action of the graded charcoal surrounding the wire.

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IT has been considered that the chemical composition of the base steel has a decided effect and may be used to control the thickness of coating, expressed in ounces per square foot, the appearance and the adherence of the coating. The work of **Dr. Sandelin** has been published in full in this monthly (13,14). He found that coarse grained steels favored heavier coatings than fine grained steels, although this is subordinate to the chemical composition of the base steel. It was found that silicon in amounts around .08 per cent improved the adherence, while above .20 per cent Si the adherence was impaired. Silicon also decreases the weight of coating, the amount depending on the grain size.

	For fine grain size	For coarse grain size
.13% Si decrease wt.	8.4%	18 %
.24% Si of coating	13.7%	22.6%

[13] All references are published at the end of this article.

Phosphorus has a tendency to increase the weight of coating, independent of grain size. It has no effect on appearance, but appears to decrease adherence.

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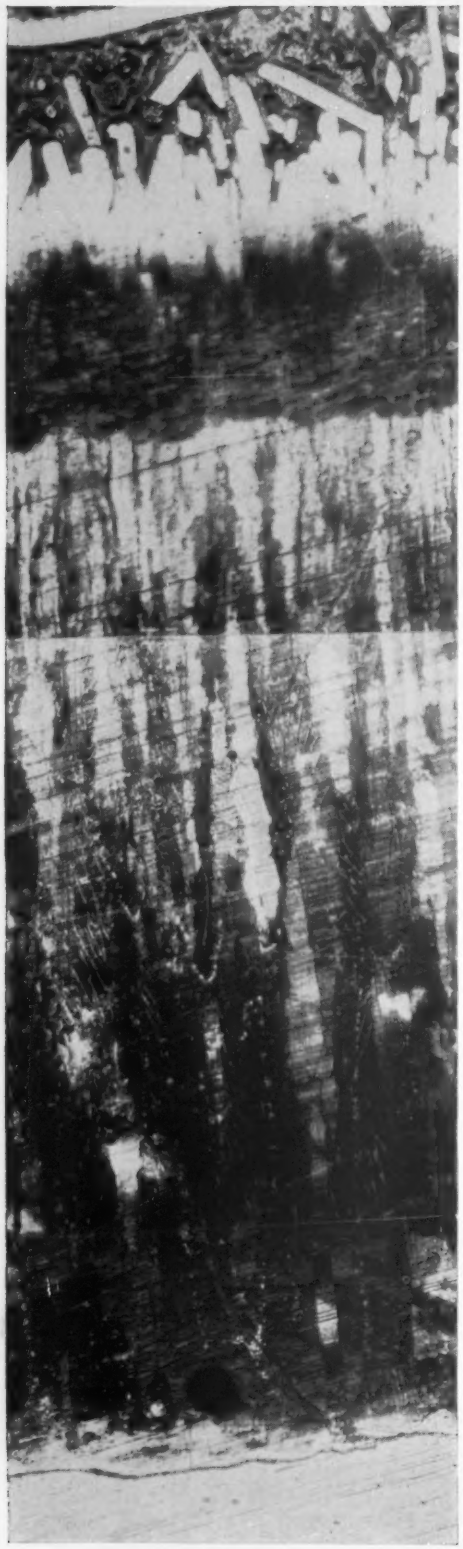
ANOTHER factor which will affect the adherence of the coating is the chemical composition of the spelter. Studies (15) have been made to determine the effect of presence of arsenic, copper, lead, bismuth, cadmium, antimony, tin and aluminum on the alloy layers, because the adherence of the coating depends on them, as will be seen later on. To make this possible a distinction was made on the effect of each element on the layers. At the time of the above study not all the alloy layers had been recognized (16), but the original work still serves the purpose: a) Alloy layer of Type I, which corresponds to the alloy layer of the type $FeZn_7$ and $FeZn_{13}$, namely alloys near the zinc side. See Fig. I. b) Alloy of type II, Fe_5Zn_{21}, namely the alloy layer close to the steel. The investigation was made at 932 F which is above commercial galvanizing practice temperatures, and for a period of 2 hours to make possible the study of the growth of alloy layers. Table III. gives a summary of this data. Note how very small amounts of aluminum eliminate altogether the alloy layer of Type II. In Fig. 1 it is easily seen how brittle this alloy layer II is. Its presence is therefore deterimental to the adherence of the zinc coating to the steel. Aluminum is used in small amounts in galvanizing chain link fence. Its use does not appear to have been successful on wire to



Alloy Type	Greek Letter	Phases	Formula, Per Cent Fe			Crystal Structure	Space Group	Atoms Elementary Cell	Parameter, Å.	Remarks
			X-ray Data	Atomic	Wt.					
— —	Eta	η	Zn		Max. 0.003	Hexagonal c.p.	D_{6h}^4	2	a — 2.6600 b — 4.9379 c/a — 1.8563	
I	Zeta ...	ζ	$FeZn_{13}$	7.2 7.4	6.0 6.2	Monoclinic	C_{2h}^3 — C_2/m	28	a — 13.65 b — 7.61 β — 128°44′ c — 5.06	There are two molecules in the unit cell.
		$\zeta+\delta_1$								
I	Delta	δ_1	$FeZn_7$ (?)	8.1 13.2	7 — 11.5	Hexagonal	$C_{6v}^4 = C_{6mc}$ or $D_{6h}^4 = C_{6mmc}$	550 ± 8	a — 12.80 c — 57.6 c/a — 1.1300 [12]	Present between room temp. and 640°C.
		δ_1 + Γ								
II	Capital Gamma.	Γ	Fe_5Zn_{21} [a]	23.2 31.3	20.5 28	b.c.c.	T_d^3	52	8.9560—8.9997	
	Alpha	α Fe	FeZn			b.c.c.	O_h^9	2	2.862—2.943	Up to 400°C. dissolves 6 per cent Zn

Note: Specimen .05 inch thick. Copper plated to permit polishing. Etched with Hydrofluoric acid. Magnification X 170.

Fig. 1. Zinc-Iron Alloy layers on a piece of steel from a galvanizing machine. Comparison with characteristics of the phases. ✦ ✦

the present time. The wire would have to come out under a controlled atmosphere. The reason is possibly the same as its lack of success in its use in the galvanizing of sheet. Aluminum oxidizes in contact with air on the surface of the molten metal. The resultant aluminum oxide is very refractory and is carried along as lumps on the sheet making for bad appearance and favoring the making of black spots. To overcome this, the **Sendzimir** process used on strip, and outlined in Process 2 table I, uses a reducing atmosphere over the zinc containing some aluminum in solution. The coated steel is maintained under the reducing atmosphere until such a time as the coating has solidified, which does not take long (4).

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THE other elements which may be considered because they reduce the amount of alloy layer of Type II are lead (2 per cent) bismuth (2.5%) Cadminum, antimony, tin. This last one would have to be added in amounts as high as 5 per cent to be highly effective. The item cost would have to be considered then. Although the price of spelter is near to 8.25 cents per pound, that of tin, if obtainable, is close to 52 cents per pound.

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SINCE the zinc is molten it oxidizes on the surface. This oxide together with some flux given off forms the waste product zinc skimmings. Various methods have been devised to reduce the waste of zinc due to oxidization, one of them consists in maintaining a layer of finely divided refractory material on the surface of the molten zinc, another in a cover where a gas flame is burned under to produce reducing conditions. The latest is a blanket formed on melting a mixture of salts. The loss of zinc in the skimmings is claimed to be reduced by 50 per cent.

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THE coated wire as it leaves the molten metal will carry along a thin film of zinc oxide, and depending on the temperature on

TABLE II
Methods of Zinc Coating and Their Control

I. Hot galvanizing

1. charcoal wipes
2. asbestos wipes
3 V shaped metal wipes
4. air wipes
5. sand wipes

II. Electrogalvanizing

1. Soluble anodes
   a) zinc cyanide electrolyte
   b) zinc sulfate electrolyte
2. Insoluble anodes
   a) zinc sulfate electrolyte
      A) high acid concentration
      B) Low acid concentration
   b) Ammonium zinc salt electrolyte

Note: In electrogalvanizing, except for the cyaniding process where the current density is of a few amperes per square foot, in the other processes, the current density may be anywhere between 500 and 2000 amperes per square foot.

TABLE III
Summary of the Effect of Addition of Elements to Molten Zinc On the Growth of Alloy Layers at 932 F According to Scheil 15)

Element	Amount Added %	Growth in inch/2 hours	Alloy Type	Alloy Layer Change in per cent
None	none	.25	II	100
Arsenic	.5	.26	II	105
	1.0	.25	II	100
	2.0	.216	II	90
Copper	1.3	.271	II	110
	2.3	.284	II	114
Lead	0.5	.256	II	103
	1.0	.244	II	100
	2.0	.216	II	90
Bismuth	1.0	.182	II	73
	2.5	.075	I-II	30
Cadmium	1.0	.192	II	77
	2.5	.154	I-II	62
	3.0	.047	I	20
	10.0	.165	I	6
Antimony	1.0	.15	I-II	60
	2.5	.122	I-II	50
Tin	1.0	.193	II	77
	2.5	.032	II	13
	5.0	.016	II	6
Aluminum	.01	.195	II	78
	.16	.002	?	.8
	.32	.0016	?	.6

the surface of the coating, this film may grow in thickness. The thickness of this film has been determined by electron diffraction studies(17). This film should be considered when discussing problems of corrosion of the coating.

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b) Electrogalvanizing

IN Table II are listed the various methods which may be used for electrogalvanizing wire. In the United States method 1-b is used, of which Process 4 table I is an outline(6,7) (18,19). The other commercial operator uses method 2-a-A in table II, and its outline is shown as Process 5 in table I(20, 21,22,23).

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THE adherence of the electrocoating is controlled by proper activation of the steel surface. If smut is present on the surface the adherence is poor. Test by bending and note whether it flakes. The electrolytic coating process gives good uniform coatings if the anodes are properly distributed around the wires, and an adequate flow of the electrolyte is maintained. The purpose of this last is to prevent the solution immediately beside the wire to become depleted of zinc ions. The thickness of the coating, and therefore the wight of coating is controlled by both the current density and the speed of the wire, or better the time of immersion of the wire in the electrolyte.

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AT the present time the insoluble electrogalvanizing method appears to have an advantage because it does not require metallic zinc. The electrolyte is replenished by leaching the ore, which has been properly prepared(23). The zinc is then in solution and is finally deposited as metal on the wire. This method, of course, releases zinc smelting and electrolytic capacity which is needed for War purposes.

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SEVERAL methods have been proposed to use waste zinc products from hot dip galvanizing to replenish the electrolyte. The use of some of these electrolytes involve certain problems. If chlorine in some form is present in the waste product, the usual insoluble anode such as lead and lead-silver (1%) become soluble. Other insoluble anodes must be used(24). Other methods may be used to eliminate this impurity or other impurities which would be deterimental to the successful coating of the steel wire.

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TO control the appearance of the coating when using soluble anodes the pH, or acidity of the electrolyte must be maintained within certain limits. This same method would be used in the electrolysis using insoluble anodes and low acid concentration electrolyte. Further addition agents may be considered(25) to control the appearance of the coating both in the low and high acid electrolytes.

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THE flow sheet of the **Bethanizing** process together with a description of the two plants have been shown in these pages(23) recently.

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IV. Finishing

THE finishing is the last fundamental operation in the coating process. It may be accomplished in one or more steps. The purpose of finishing is:

1. **to cool the wire or to dry it, as the case may be.**
2. **to improve the character of the coating.**
3. **to change the appearance.**

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THERE are a variety of finishes which may be applied to hot galvanized coatings. Charcoal wiped coatings and asbestos wiped coatings are usually allowed to cool in air. The last, when produced in very thin coatings (.1 to .3 oz./sq. ft) may suddenly be chilled in water.

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A VERY interesting method of finishing hot dip coatings is by subsequent heat treatment. This is done to accomplish item 2 above. By heat treatment the growth of the $FeZn_{13}$ alloy layer is favored(26,16). This has been established by chemical analysis and X-ray diffraction studies. The above alloy appears to be more corrosion resistant than the others, therefore it is desirable to promote its growth. Further, on bending, although the coating may dust, it does not flake off leaving bare large areas of surface underneath. Zinc by sacrificing itself can protect the steel for a certain length of time. The heat treated coating, not leaving bare such large areas, does not require the zinc and the alloy layers to sacrifice themselves to so large an extent, and therefore it gives longer life.

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THE **American Society for Testing Materials** is carrying out an outdoor program of testing coatings on wires at various locations, industrial, semirural, rural, and marine(27). For the Pittsburgh location the test has gone far enough so that specimens with up to 1.0 oz./sq. ft. coating have shown 100 per cent rust(28). The preference in using hot dip galvanized and electrogalvanized coatings has been contradictorily discussed in the technical and scientific literature. In addition to the well known factors of uniformity of coating, and weight of coating the atmosphere index(29) must be considered when discussing the life of a coating. From the results obtained up to date, it is evident that for a number of locations the weight of coating does not need to be so heavy as for others(28). This should be considered at the present time to conserve zinc, particularly for civilian consumption, and to make the zinc which goes for coating of military materials go further.

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THE electrogalvanized coating may be finished with simply two or more washings, the last in hot water to speed up the drying of the coating. If the wire is wet as it is reeled, the thin film of water would be soon active in promoting white rust on the electrogalvanized wire. If the wire is not bright enough it may be polished. This is done by using either dies, which compresses the relatively soft electrodeposited zinc. The same effect is obtained by burnishing by means of a polisher.

Economics of Coating

THE various steps in the production of coated wire have been presented. There remains only to compare some technical and economic factors characteristic of hot dip galvanizing and electrogalvanizing. Table IV shows schematically a few of the latter (6,30).

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THE cost of equipment is high for electrogalvanizing units, because of motor generator, or some appropriate direct current generator, necessary appropriate rubber covered steel tanks to prevent their corrosion by the electrolyte, and heavy investment in anodes. When using the insoluble anode method, an auxiliary plant to leach the ore and remove the impurities from the electrolyte is necessary.

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THE costs have been indicated here in percentage, although actual figures have been given in the literature (6,30) some time ago.

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TABLE V. summarizes and compares the properties of the hot galvanized and the electrogalvanizing methods for wire as used commercially at present.

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THE cost for the same weight of coating on wire would appear to be higher on electrogalvanized wire. For some locations this higher cost does not warrant the use of electrogalvanized wire. On the other hand heavier coatings can be applied by electrogalvanizing than are possible by hot dipping. If such a heavy coating is desired, the cost of the wire so produced is justifiable.

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SOME of the other properties have been discussed at length before and need no further comments.

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THE metallurgical characteristics of the various types of coating may be of interest here. They have been listed in table VI. Note the growth of the $FeZn_{13}$ alloy layer when a hot dipped coating has been heat treated. It is of interest that a coating on wide strip by the Sendzimir process (4) shows very little alloy layer, and to this time it has not been made public whether it is an Fe-Zn alloy, or some type of Al alloy.

TABLE IV
Comparative Costs for Galvanizing and Electrogalvanizing

	Hot galvanizing	Electrogalvanizing 1. Soluble-Anodes-Insoluble	
Equipment and Installation	**low**	**high**	
1. Direct materials (spelter, ore, Zn)	**54%**	**46%**	**33 %**
2. Direct labor	**16**	**19**	**16.5**
3. Indirect materials	**17**	**8**	**3.5**
4. Indirect labor	**4**	**4**	**4**
5. Power, fuel, etc.	**5**	**13**	**33**
6. Maintenance, supervision	**4**	**10**	**10**
Total	**100%**	**100%**	**100 %**

TABLE V
Comparison of Properties of Hot Galvanized and Electrogalvanized Wire

	Hot galvanized	Electrogalvanized
1. Selling price	**Depends on competition**	
2. Adherence of coating	**Good if properly produced**	
3. Uniformity of thickness	**Depends on control**	**Good**
4. Appearance	**Depends on purpose and demand**	
5. Maximum weight of coating applicable	**1.2 oz./sq. ft.**	**theoretically no limit, actually 3 oz./sq. ft. (depends also on wire gage coated)**
6. Steel coated	**low carbon steel**	**Low C, tempered and high C steels**
7. Life of coating (for equal weight of coating)	**Depends on atmosphere index**	
8. Ductility of coating	**Fair**	**High**
9. Waste in processing	**Dross and zinc skimmings**	**"drag out" (low)**
10. Production (tonnage) in 1940, 1941	**7 tons for**	**1 ton**

TABLE VI
Phases Present in Zinc Coatings (in per cent)

	Fe	Fe_2Zn_{21}	$FeZn_7$	$FeZn_{13}$	Zn	ZnO
Hot dipped	**x**	**18%**	**30%**	**2%**	**50%**	**x**
Hot dipped heat treated	**x**	**3%**	**27%**	**60%**	**10%**	**x**
Electrogalvanized	**x**				**99.99%**	
Sendzimir Process on strip	**x**		**10% (?)**		**90%**	

Notes: x present. The percentages are based on microscopic, chemical and X-ray diffraction measurements of some typical commercial coatings.

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Testing and Specifications

SPECIFICATIONS have been adopted by the various national agencies, the Federal government, the **Army** and the **Navy**, and by committees of the **American Society of Testing Materials.** For particulars they must be consulted. Methods of testing and inspection are part of the above specifications, and others of a more restricted nature have been extensively discussed in the literature. A good presentation with extense bibliography is the article by **Kenworthy (31).**

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IT should be noted that various tests may be made use of to show a particular quality of a coat-

(*Please turn to Page 368*)

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Hot Dip Tinning of Carbon Steels As Affected By Variation of Carbon, Phosphorous, Copper, Silicon, Manganese, Aluminum and Titanium

By Morris E. Fine[1] and Ralph L. Dowdell[2]

(Published in Three Parts)

PART III

Part III containing (3) Thickness of Tin Coating, (4) Determination of the Number of Pin-Holes or Discontinuities in the Tin Coating, (5) Conclusions and Discussions of Conclusions, (6) Table of References.

3. Thickness of the Tin Coating.

TWO methods were used for determining the thickness or weight of the tin coating. The first method used was that of **Clarke**[11]. This method consists of stripping off the tin from a measured area with a cold hydrochloric acid solution containing antimony trichloride. This solution, which is made by dissolving 20 grams of antimony trioxide (Sb_2O_3) in 1 liter of cold hydrochloric acid (sp. gr. 1.146), supposedly does not attack steel. Clarke's procedure is as follows: the tin plate after degreasing is immersed in the solution until gas evolution ceases. It is then allowed to remain in the solution for a further period of 1 minute, removed, swabbed with cotton, and dried. The specimen is weighed before and after. The loss in weight divided by the area is a measure of thickness of the coating.

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THIS solution according to **Clarke** does not attack steel because as the tin is removed antimony plates out on the steel, supposedly preventing the steel from going into the solution; however, this was not found to be true. Hydrogen evolution continued after all the tin was gone; moreover, the rate of solution of the steel varied with the steel. The first one-half minute the specimens were immersed in the solution a large amount of hydrogen was evolved, but the rate slowed down after this, tin being still left on the specimen. There was no sudden change in the rate of hydrogen evolution when all the tin was gone, either. Due to listing the tin was thicker on certain parts of the specimens than others and the steel under these thicker areas was exposed to the acid for a shorter length of time. For these reasons the thicknesses arrived at by **Clarke's** method are not very accurate. The tin from one set of samples (Thus one specimen of each steel analysis) was removed by this method.

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THE thickness of the tin coating was also measured by an **Aminco Brenner Magne-Gage**[12]. The **Magne-Gage** consists of a rod shaped hemispherical ended magnet connected to a hairspring. The magnet is lowered until it touches the plated specimen, and the force to pull it away is measured. This force is inversely proportional to the square of the thickness of the non-magnetic coating (tin in this case) on the magnetic steel base. The magne-gage is claimed by the maker to be accurate to ± 10 per cent. Since the area measured is small (diameter of the hemisphere at the end of the magnet is 0.08 inch) the magne-gage is well adapted to measuring variations in thickness of coating on the same specimen. Using a magne-gage variations of about 50 per cent were found on commercial tin plate and variations as high as 100 per cent on the specimens tinned for this thesis. Eight thickness measurements were made near the top of each specimen where the tin was found to be thinnest. These eight readings were averaged for each specimen. One complete set of specimens and part of another set were measured in this way.

✦ ✦ ✦

THE thicknesses arrived at by Clarke's method and measured with the magne-gage are given in Table VIII. By **Clarke's** method the thickness varies from 4.23 to 8.46 ten thousandths of an inch; however, no correlation could be found between thickness and com-

11. **All references are published at the end of this article.**

1. **Research Fellow. Abstract of thesis presented in partial fulfillment of requirements for the M.S. degree, University of Minnesota, 1942.**

2. **Professor of Metallography, University of Minnesota.**

Table VIII — Thickness of Coating of Specimens of Each Composition *

A	Rimming Steels			
	Thickness by Stripping			
Spec No.	Grams tin per sq. inch	Thickness in Ten Thousandths inch	Thickness by Magnetic Method in Ten Thousandths inch	Chemical Composition
1917	.0584	4.95	1.4	.05C
1889	.0758	6.61	1.4	.07C
2283	.0834	7.07		.08C
2311	.0570	4.83	1.7	.08C
2774	.0639	5.42	1.3	.04C

B **Individual Heats**

Spec No.	Thickness by Stripping: Grams per sq. inch	Thickness by Stripping: Thickness in Ten Thousandths inch	Thickness by Magnetic Method in Ten Thousandths inch	Chemical Composition: C	P	S	Mn	Cu	Si
1082	.0658	5.08	1.9	.10	.077	.027	.44	.302	.292
1083	.0693	5.88	1.9	.10	.010	.020	.43	.216	.270
1833	.0708	6.01	2.2	.19	.018	.075	.90	.200	.121
2821	.0552	4.68	1.4	.10	.057	.028	.39	.387	.005

* The thickness of the tin coating was determined by stripping and also with the Aminco-Brenner Magne-Gage.

C **Rephosphorized-Silicon Killed Steel with Varying Silicon**

Base Composition	C	P	S	Mn	Cu	Si
#1	.10	.099	.035	.39	.292	.200

Spec No.	Thickness by Stripping: Grams tin per sq. inch	Thickness by Stripping: Thickness in Ten Thousandths inch	Thickness by Magnetic Method in Ten Thousandths inch	Chemical Composition
1	.0751	6.38	1.7 2.0	0.200 Si
2	.0822	6.97	1.7	0.500 Si

D **Aluminum Killed Steel with Variation in Silicon, Phosphorus, and Copper — Heat #1071**

Base Composition	C	P	S	Mn	Cu	Si
#12	.10	.011	.024	.44	.310	.0094

Spec No.	Thickness by Stripping: Grams tin per sq. inch	Thickness by Stripping: Thickness in Ten Thousandths inch	Thickness by Magnetic Method in Ten Thousandths inch: Set 1	Set 2	Chemical Composition: Si	P	Cu
12	.0829	7.03	1.2	1.5	.0094		
1	.0853	7.24	1.7		.214		
12	.0829	7.03	1.2	1.5		.011	
14	.0844	7.49	1.3	1.3		.067	
4	.0883	7.55	1.6			.087	
12	.0829	7.03	1.2	1.5			.310
7	.0890	7.55	1.5				.622
5	.0934	7.92	1.4				.652
12	.0829	7.03	1.2	1.5	.0094	.011	.310
6	.0940	7.96	1.5		.173	.011	.590
9	.0542	4.58	1.8		.181	.011	.503
13	.0769	6.43	1.7		.187	.079	.310
10	.0644	5.46	1.4		.0094	.066	.484
11	.0810	6.87			.0094	.079	.759
8	.0764	6.48	1.5	1.5	.196	.067	.452

position. Some other factor was causing this difference. With the magne-gage the thickness varied from 1.4 to 2.1 ten thousandths of an inch. The discrepancy between the thicknesses arrived at is partly due to the fact that **Clarke's** method gives an average while the thicknesses with the **magne-gage** were determined in the thinnest place. The magne-gage is calibrated with chrome-plate standards and the calibration may be different for hot-dipped tin. **Brenner**[12] himself got values 25 per cent low using his gage on commercial tin plate of about one ten-thousands of an inch thick. Even though the magne-gage reads low these values are perfectly good for comparison with one another, but no correlation between thickness and composition of the steel was found using either the magne-gage or stripping test. The thicknesses obtained from the two sets by the magne-gage check fairly well, but the thickness of the tin coatings obtained by **Clarke's** method and by the magne-gage do not check very well for samples cut from the same billet.

\+ \+ \+

4. Determination of the Number Of Pin-Holes or Discontinuities In the Tin Coating.

DISCONTINUITIES in the tin coating called pin holes are probably the most common imperfections of the tin coating. Many methods of determining the number of pin holes were tried, but only one or two per specimen could be found. The two standard methods are the **hot water test**[13] and the **ferricyanide paper test**[13]. Both of these were tried and in addition a **ferricyanide gel test** [14, 15]. In the original Walker test, it was suggested that the tin plate be soaked overnight in a dilute ammonium chloride solution. This is of course corrosive to tin and would increase the number of pin holes. In the hot water test the distilled water to be used must be pink to methyl red indicator and enough dilute hydrochloric acid is supposed to be added until the water is very slightly pink to methyl red. No distilled water not even redistilled

water was found that was pink to methyl red. Only 1 cc of 0.01 normal HCl to 1 liter of water was necessary to correct the acidity (this is amount recommended by MacNaughtan, etc.), but this was enough to cause corrosion of pure tin.

✦ ✦ ✦

THE safest method and the method found to bring out the most pin holes was found to be as follows. After degreasing, so that the tin plate retained a film of distilled water with **no water break**[12], the tin plate was placed over a vessel containing distilled water. The water was heated to 80°C, and the water vapor given off was allowed to condense on the tin plate and drip back into the container. Rust spots formed at discontinuities in the tin layer. This treatment was carried out for 24 hours.

✦ ✦ ✦

SINCE no correlation between the number of pin holes and the composition was found and since only a very few pin holes were found on each specimen, it was concluded that the composition of the steel had no effect on the number of pin holes in that range of chemical composition tested and with the method of tinning used.

✦ ✦ ✦

V. Conclusions and Discussion Of Conclusions

SAMPLES of sixty-three steels differing in analyses and covering the range of analysis given below in Table IX were tinned under constant conditions. The resulting tin-plated specimens were tested to determine the following.

Table IX — Range of Composition Covered by the Sample Steels

Element	Range of Analysis
Carbon	0.04 - 0.35 %
Phosphorus	0.008 - 0.099
Sulfur (Not varied)	0.019 - 0.075
Manganese	0.27 - 0.89
Copper	0.170 - 0.759
Silicon	0.001 - 0.675
Aluminum*	Trace - 0.303
Titanium*	0.000 - 0.169

* Only analyzed in heat #2178

1. Appearance and smoothness of the coating to naked eye and under low magnification.
2. Appearance of polished sections under high magnification.
3. Thickness of the iron-tin compound layer.
4. Thickness of the tin coating.
5. Continuity of the tin coating.

E Aluminum-Silicon Killed Steel with Variation in Carbon, Aluminum, and Titanium — Heat #2178

Base Composition	C	P	S	Mn	Cu	Si	Al	Ti
#8	.05	.011	.026	.45	.229	.120	Trace	.000

	Thickness by Stripping		Thickness by Magnetic Method in Ten Thousandths inch				
Spec No.	Grams tin per sq. inch	Thickness in Ten Thousandths inch	Set 1	Set 2	Chemical Composition C	Al	Ti
8	.0677	5.74	1.6	1.5	.05		
1	.0544	4.71	2.1		.20		
2	.0643	5.46	2.0	1.8	.35		
8	.0677	5.74	1.6	1.5		Trace	
6	.0479	4.06	1.1	1.6		.145	
7	.0709	6.02		1.6		.303	
8	.0677	5.74	1.6	1.5			.000
3	.0684	5.80	1.8	1.5			.042
4	.0781	6.64	1.7	1.7			.100
5	.0880	7.46	1.6	1.5			.169

F Silicon Killed Steel with Variation in Phosphorus, Manganese, Copper, and Silicon — Heat #2913

Base Composition	C	P	S	Mn	Cu	Si
#10	.32	.017	.027	.50	.191	.127

	Thickness by Stripping		Thickness by Magnetic Method in Ten Thousandths inch					
Spec No.	Grams Tin per sq. inch	Thickness in Ten Thousandths inch	Set 1	Set 2	Chemical Composition P	Mn	Cu	Si
10	.0952	8.07	1.7	1.9	.017			
8	.0996	8.45	1.8	1.8	.040			
9	.0788	6.68	2.2	1.8	.080			
10	.0952	8.07	1.7	1.9		.50		
6	.0998	8.46	1.7	1.7		.69		
7	.0956	8.12	2.0	1.8		.89		
10	.0952	8.07	1.7	1.9				.127
3	.0995	8.43	1.7	2.1				.248
4	.0722	6.12		2.0				.357
5	.0912	7.73	2.1	1.9				.625
10	.0952	8.07	1.7	1.9			.191	
1	.0969	8.21	1.8	1.8			.358	
2	.0989	8.38	2.1	1.9			.600	

✦ ✦ ✦

ASIDE from the fact that high silicon may cause a slightly rougher coating and that high silicon and high manganese tend to increase the thickness of the compound layer, no other correlations between composition and properties of the tin-plate coating were found. It would be expected that the thickness of the alloy layer would be dependent upon the composition since the composition of the steel influences the rate of diffusion of tin into the steel or iron into tin. Since no diffusion takes place in the tin layer no correlation was expected, and this was found to be true.

✦ ✦ ✦

ANY steel in the range covered can be tinned satisfactorily provided the correct tinning practice is used. The base plate in each specimen was covered with tin completely with only one or two pin holes per specimen.

G Aluminum Killed Steel with Variation in Phosphorus, Manganese, Copper, and Silicon — Heat #3626

Base Composition	C	P	S	Mn	Cu	Si
#10	.17	.019	.032	.48	.235	.015

Spec No.	Thickness by Stripping: Grams Tin per sq. inch	Thickness by Stripping: Thickness in Ten Thousandths inch	Thickness by Magnetic Method in Ten Thousandths inch: Set 1	Thickness by Magnetic Method in Ten Thousandths inch: Set 2	Chemical Composition: P	Mn	Cu	Si
10	.0500	4.23	1.8	1.6			.235	
1	.0854	7.28	1.5	1.6			.388	
2	.0978	8.30	1.9	1.5			.676	
10	.0500	4.23	1.8	1.6				.015
3	.0993	8.42	2.1	2.1				.132
4	.0725	6.15	1.9	1.9				.249
5	.0938	7.96		1.6				.508
10	.0500	4.23	1.8	1.6		.48		
6	.0907	7.68	2.0	1.8		.73		
7	.0738	6.26	1.6	1.8		.85		
10	.0500	4.23	1.8	1.6	.019			
8	.0953	8.07	1.7	1.8	.045			
9	.0980	8.30		1.9	.084			

H Aluminum Killed Steel with Variation in Copper, Phosphorus, and Silicon — Heat #2959

Base Composition	C	P	S	Mn	Cu	Si
#12	.11	.015	.028	.42	.175	.0094

Spec No.	Thickness by Stripping: Grams tin per sq. inch	Thickness by Stripping: Thickness in Ten Thousandths inch	Thickness by Magnetic Method in Ten Thousandths inch	Chemical Composition: Si	P	Cu
12	.0991	8.40	1.6	.015		
10	.0655	5.56	1.6	.033		
1	.0873	7.42	1.1	.070		
12	.0991	8.40	1.6		.175	
2	.0769	6.52	2.0		.289	
3	.0845	7.17	1.3		.470	
12	.0991	8.40	1.6			.009
4	.0952	8.08	1.4			.412
12	.0991	8.40	1.6	.015	.175	.009
5	.0839	7.11	1.3	.015	.400	.436
7	.0991	8.40	2.3	.086	.175	.570
8	.0660	5.58	1.5	.060	.470	.009
9	.0953	8.07	2.3	.080	.377	.568
11	.0848	7.19	1.7	.070	.475	.560

VARIATIONS in tinning properties of steels from the same heat not correlated with composition are small, and therefore the properties of the tin coating are not greatly dependent on small changes in mill practice. The smoothness of the coating varied from heat to heat, but most of this variation (except with rimming steels) can be correlated with the deoxidation. Aluminum killed steels were found to give a smoother coating than silicon killed steel.

AS compared to galvanizing[2], the influence of the chemical composition of the steel base on tinning was found to be slight. This is due to the lower solubility of tin in ferrite as compared to zinc in ferrite. In an investigation on the influence of the chemical composition of the steel on galvanizing, **Sandelin**[2] also found that an increase in the thickness of the alloy layer in zinc coatings was associated with increased silicon in the steel.

✦ ✦ ✦

VI. Summary of Conclusions

1. **All the samples tinned satisfactorily after pickling five minutes in 3.5 normal HCl at 140°F.**
2. **An increase of silicon caused an increase in the roughness of the coating when observed with a low power microscope.**
3. **An increase in silicon and manganese caused an increase in the thickness of the iron-tin alloy layer.**
4. **No other correlations between composition and properties were found.**

✦ ✦ ✦

ACKNOWLEDGMENTS

The authors are especially indebted to other members of the Division of Metallography of the University of Minnesota, Dr. H. S. Jerabek and Miss Carrie H. Green.

They are also indebted to the Atlantic Steel Company of Atlanta, Georgia, and Dr. R. W. Sandelin, metallurgist of that company, for making the steels used in this investigation, to the Minnesota Mining & Manufacturing Co. of St. Paul for the use of their polishing equipment, to Superior Metal Products Company of St. Paul for tinning the samples and to Superior Plating & Rustproofing Company of Minneapolis for the use of their Aminco-Brenner magne-gage for measuring the thickness of the tin coatings.

✦ ✦ ✦

REFERENCES

1. **T. G. Grey Davies, "The Occurrence of "Blisters" in Tinplates, with Special Reference to Original Ingot Structure". Sheet Metal Industries Vol. 8 No. 89, Sept. 1934, pp. 507 - 9, 514.**
2. **R. W. Sandelin, "Galvanizing Special Steels", PhD Thesis, Univ. of Minnesota 1940. Also, "Galvanizing Characteristics of Different Types of Steel", WIRE AND WIRE PRODUCTS, Vol. 15, No. 11, Nov. 1940, pp. 655 - 696, Vol. 15, No. 12, Dec. 1940, pp. 721 - 749, Vol. 16, No. 1, Jan. 1941, pp. 28 - 35. This was judged to be the Prize Research Paper for 1940 of The Wire Association.**

(Please turn to Page 360)

✦ GOVERNMENT WIRE PRODUCTION INFORMATION ✦

O.P.A. Maximum Prices for Brass or Wire Mill Products

THE complete text of Order No. 10—Maximum Prices For Brass or Wire Mill Products, follows: ✦ ✦ ✦

Part 1499—Commodities And Services

[Maximum Prices Authorized Under §1499.3 (b) of the General Maximum Price Regulation—Order No. 10]

FOR the reasons set forth in an Opinion issued simultaneously herewith and filed with the Division of the Federal Register, and pursuant to and under the authority vested in the Price Administrator by the Emergency Price Control Act of 1942 and §1499.3 (b) of the General Maximum Price Regulation, it is hereby ordered that:

§ 1499.45 Authorization to sellers of brass or wire mill products. (a) Whenever a seller of a brass or wire mill product cannot determine his maximum price for such product under § 1499.2 for the General Maximum Price Regulation, the maximum price for such brass or wire mill product shall be the price set forth in the applicable schedules of list prices, extras and discounts of the American Brass Company, General Cable Corporation, Revere Copper & Brass, Inc., Bridgeport Brass Company, Anaconda Wire & Cable Company, or any one of them, in effect during March, 1942, for a sale of the same quantity of such product to an industrial consumer. This paragraph (a) does not apply to a sale at wholesale or retail, as defined in § 1499.20 of the General Maximum Price Regulation, or to a sale by a distributor of brass or wire mill products, or a sale by a brass or wire mill.

(b) Whenever a distributor of a brass or wire mill product cannot determine his maximum price for a brass or wire mill product under § 1499.2 of the General Maximum Price Regulation, specific authorization is hereby given to such distributor to determine his maximum price for such product under § 1499.3 (a) of the General Maximum Regulation.

(c) As used in this Order No. 10:

(1) "Brass or wire mill product" means any new plate, sheet, strip, roll, coil, wire, rod, bar, tube, tub-

(*Please turn to Page 356*)

Exports and Imports of Wire

AS a wartime measure to prevent vital information being given to the enemy, the Bureau of the Census has suspended publication of the "Monthly Summary of Foreign Commerce of the United States," beginning with the October issue. As soon as this suspension order is rescinded, we will resume publication of Exports and Imports data.

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Government Wire Production Information

(*Continued from Page 355*)

ing, pipe, extrusion, forging, anode or other shape made from copper or copper base alloy by a brass or wire mill. It does not include any rod, coil, wire or other shape for which a maximum price is established by Revised Price Schedule No. 82—Wire, Cable and Cable Accessories.

(2) "Copper base alloy" means any alloy metal in the composition of which the percentage of copper metal by weight equals or exceeds 40% of the total weight of the alloy.

(3) "Industrial consumer" means any person who purchases any brass or wire mill product for the purpose of fabrication.

(4) "Distributor of brass or wire mill products" means any person whose business includes receiving delivery of brass or wire mill products and the resale thereof to an industrial consumer without a substantial change in form.

(d) This Order No. 10 may be revoked or amended by the Price Administrator at any time.

(e) This Order No. 10 (§ 1499.45) shall become effective as of May 11, 1942.

(Pub. Law 421, 77th Cong.)

Issued this 12th day of June, 1942.

LEON HENDERSON,
Administrator.

✦ ✦ ✦

Acceptance Sought of Wire Screen Proposal

A STANDING committee, representing producers of aggregate and the manufacturers of screens and screening machinery, is proposing a revision of simplified practice recommendation R147-33 "Wire Diameters for Mineral Aggregate Production Screens" according to the Division of Simplified Practice, National Bureau of Standards, Washington, D. C.

✦ ✦ ✦

THE Recommendation lists wire sizes recommended for the construction of mineral aggregate production screens of various sizes of clear square opening. The original recommendation, drafted in 1932, reduced the variety of

wire diameters for openings ranging from 1/8 to 3 inches by approximately 75 per cent of their former number.

✦ ✦ ✦

IT is now proposed to add to the schedule wire diameters for screens with clear square openings of 3½ and 4 inches, adding only one new wire diameter. Mimeographed copies of the proposed revision may be obtained free from the Division of Simplified Practice.

✦ ✦ ✦

Cold Finished Bars Advisory Committee

JOSEPH T. SOMERS, president of the Wyckoff Drawn Steel Company, of Pittsburgh, Pa., has been elected chairman of the Cold Finished Bars Advisory Committee of the Office of Price Administration, Price Administrator Leon Henderson announced.

✦ ✦ ✦

THE committee is one of four iron and steel industry advisory units created by the Price Administrator last month to serve as liaison groups between OPA and the industry on any problems which may arise with respect to prices.

✦ ✦ ✦

OTHER members of the Cold Finished Bars Advisory group are: **W. R. Howell**, of Bliss & Laughlin, Inc., Harvey, Ill.; **T. L. Kelby**, of LaSalle Steel Company, Chicago; **V. A. Jevon**, of Jones & Laughlin Steel Corporation, Pittsburgh, Pa.; **W. N. Lynch**, of Keystone Drawn Steel Company, Spring City, Pa.; **E. L. Parker**, of Columbia Steel and Shafting Company, Pittsburgh, Pa.; and **F. C. Young**, of Union Drawn Steel Division of Republic Steel Corporation, Massillon, O.

✦ ✦ ✦

THE group, in keeping with the terms of the Price Control Act of 1942, is purely advisory. It meets at the call of the chairman to discuss any price questions or problems arising in connection with Revised Price Schedule No. 6, on iron and steel products, or allied orders affecting this branch of the steel industry.

(*Please turn to Page 358*)

Regular "Member of the Crew" at Sea

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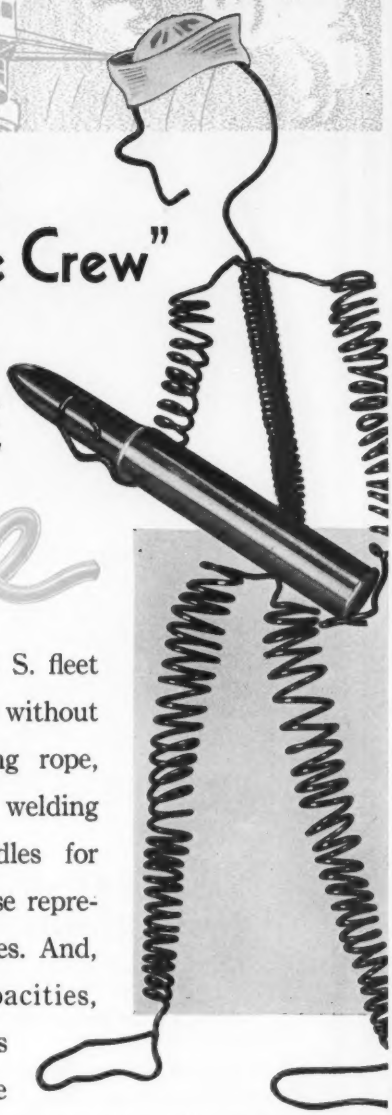

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Government Wire Production Information

(*Continued from Page 357*)

Prohibit Iron and Steel in Mattress Manufacture

ACCORDING to Amendment No. 1 to Limitation Order L-49, recently issued by the Director of Industry Operations, the production of mattresses or pads containing iron or steel is prohibited after September 1st.

✦ ✦ ✦

DURING July and August, a manufacturer of innerspring mattresses or pads may produce twice his average monthly production of such products in the twelve months ended June 30, 1941.

✦ ✦ ✦

THE Order does not affect the manufacture of mattresses or pads filled with cotton, felt, or hair.

✦ ✦ ✦

IT is also stated that effective June 8th no manufacturer of innerspring mattresses or pads may acquire any wire for the production of such products, except from the inventories of other manufacturers of innerspring units.

✦ ✦ ✦

IN addition, a manufacturer may not sell or deliver any of his inventory of iron or steel, except as follows:

✦ ✦ ✦

FOR use by other manufacturers of bedsprings and mattresses; for use to fill orders bearing a preference rating of A-3 or higher; or for sale to the Defense Supplies Corporation, Metals Reserve Company, or any other Government purchasing agency. No restrictions are placed on the sale or delivery of any finished products a manufacturer has on hand or is permitted to manufacture under L-49.

✦ ✦ ✦

THIS amendment is designed to save approximately 43,000 tons of high carbon wire a year for war materials.

✦ ✦ ✦

List A of Conservation Order M-43-a

ACCORDING to List A of Conservation Order M-43-a the use of tin in the items listed be-

low and in all component parts thereof is prohibited except to the extent permitted by the foregoing order.

Advertising Specialties.
Art Objects.
Automobile Body Solder, or any material used as a filler or smoother for automobile or truck bodies or fenders.
Band and other Musical Instruments (except for maintenance and repair of pipe organs for religious and educational institutions).
Beverage Dispensing Units and Parts thereof including pipe (except for maintenance and repair of existing units, and only where and to the extent that used tin pipe in an amount equal in tin content to the tin required, is returned by the customer to the supplier).
Britannia Metal.
Broom Wire.
Buckles.
Buttons.
Chimes and Bells.
Emblems and Insignia.
Fasteners: Eyelets, Spiral Binders, Office and Industrial Staples, Book Match Clips, Paper Clips, Zippers, Dress Hooks.
Foil—except for: (1) Electrotyping and Moulding Lead in Printing Trade, (2) X-Ray Supplies and (3) Dental Use, provided the tin content shall be limited to 30% by weight.
Galvanizing.
Household Furnishings and Equipment.
Jewelry.
Kitchen Equipment (including cutlery and tableware), except articles for food preparation.
Novelties, Souvenirs and Trophies.
Ornaments and Ornamental Fittings.
Pewter and Pewter Holloware.
Plating or Coating for Decorative Purposes.
Powder (decorative).
Refrigerator Trays and Shelves.
Seals and Labels (except meat seals).
Slot, Game and Vending Machines.
Coated Paper.
Oxide in Enamelware as an Opacifier.
Toys and Games.

✦ ✦ ✦

Order L-146 Controls Welding Rod and Electrode Distribution

EFFECTIVE June 13th the distribution of welding rods and electrodes has been placed under strict control by the issuance of Limitation Order L-146 it was announced recently by the Director of Industry Operations, and, in addition, all makers must file a record of shipments with WPB on Form PD-528 on or before the 18th day of each month.

✦ ✦ ✦

DELIVERIES will be permitted to the Army, Navy, specified government agencies, accredited schools which train welding operators, or schools within an industrial plant which meet certain instruction qualifications.

✦ ✦ ✦

DELIVERIES of ordinary rods and electrodes are confined to orders bearing a Preference Rating of A-9 or higher. In the case of alloy electrodes or rods, which mean ferrous—base electrodes or rods whose core wire contains more than 2% by weight of materials other than iron or carbon, deliveries may not be made except on orders of A-1-j or higher.

✦ ✦ ✦

Steel for 90 mm. Armor-Piercing Shot Placed Under Allocation

STEEL for 90 mm. armor-piercing and semi-armor-piercing shot was placed under complete allocation May 26 by the Director of Industry Operations.

✦ ✦ ✦

THIS size was added to others under allocation in Order M-21-f, which was issued February 17.

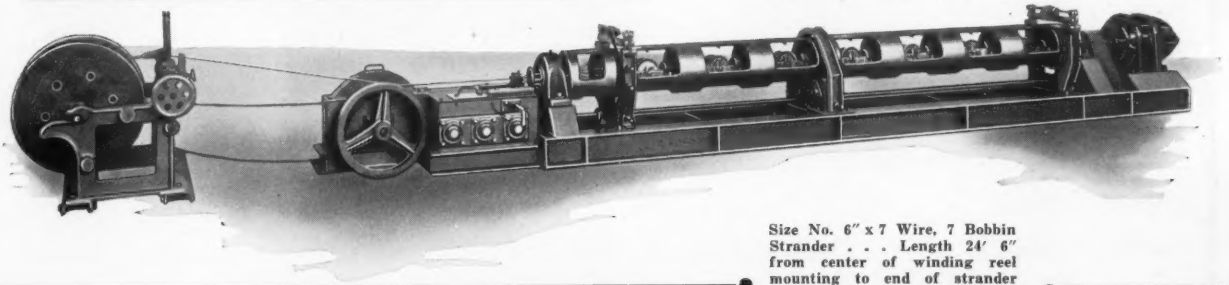
ROBINSON TUBE-TYPE **WIRE STRANDERS**

Dynamically Balanced! No Vibration!

IN this new Robinson Tube-Type Wire Strander are embodied the suggestions of engineers and operators of numerous wire cable plants throughout the country. As a result of careful study and field contact, this machine now meets the most exacting requirements of the industry. Frame, main and take-off bearing mounts, gear housing and base are of all-welded construction—as structurally stable as though cast in a single unit. Steel tube of high tensile strength is statically and dynamically balanced. Gear box is designed to produce any lay within the range of lays required for its size and type. All high-speed gears are fully enclosed; they operate in a continuous oil bath. Supporting rollers of the best quality highly compressed fibrous material are mounted on spindles running in adjustable ball bearings. Bobbin latches and bobbin brakes are of new design and semi-automatic in operation.

Full information available upon inquiry. Your priority rating may permit of immediate consideration.

Write for Illustrated Manual



Size No. 6″ x 7 Wire, 7 Bobbin Strander . . . Length 24′ 6″ from center of winding reel mounting to end of strander motor. Width of strander 31″. Approximate gross weight for domestic shipment 3,000 lbs. Reel stand shipping wgt. 450 lbs.

ROBINSON MANUFACTURING COMPANY
WORKS — MUNCY, PENNA.
Sales & Executive Offices — **30 CHURCH STREET . . . NEW YORK, N. Y.**

UNIQUE

Hot Dip Tinning of Carbon Steels

(Continued from Page 354)

3. Committee representing National Canners' Association, American Can Co., and Titanium Alloy Manufacturing Co., "Canned Food Containers; A Study with Special Reference to the Influence of Steel-Base on Resistance to Perforation", NATIONAL CANNERS ASSOCIATION RESEARCH Bulletin No. 22L, 1923.

4. T. P. Hoar, T. N. Morris, and W. B. Adams, "The Influence of the Steel-Base Composition on the Rate of Formation of Hydrogen-Swells in Canned-Fruit Tinplate Containers, Part I," JOURNAL IRON AND STEEL INSTITUTE, Vol. 140, 1939, pp. 55 - 92.

5. R. R. Hartwell, "Corrosion Resistance of Tin Plate Influence of Steel Base composition on Service Life of Tin Plate Containers". American Society for Metals, Preprint No. 44, Mtg. Oct. 21 - 25, 1940 pp. 35.

6. P. Rocquet, "Flux Inclusions in Hot Dipped Tin Coatings." Int. Tin Research and Development Council Bulletin No. 80, 1938.

7. R. W. Sandelin, "Galvanizing Special Steels" PhD Thesis, University of Minnesota, 1940 also "Galvanizing Characteristics of Different Types of Steel", WIRE AND WIRE PRODUCTS, Vol. 15 No. 11, Nov. 1940 pp. 655 - 696, Vol. 15 No. 12, Dec. 1940 pp. 721 - 749, Vol. 16 No. 1, Jan. 1941 pp. 28 - 35.

8. W. F. Ehret and A. F. Westgren, "X-Ray Analysis of Iron-Tin Alloys", JOUR AM CHEM SOC, Vol. 55, 1933, pp. 1339 - 1351.

9. C. A. Edwards and A. Preece, "A Study of the Constitution of the Iron-Tin Alloys, JOURNAL IRON AND STEEL INSTITUTE, Vol. 124, 1931, pp. 41 - 69.

10. O. E. Romig and D. H. Rowland, "Some Notes on the Metallography of Tin and Zinc Coatings on Steel", paper presented before a Chicago meeting of the A.I.M.E., Oct. 24, 1939.

11. S. G. Clarke, "A Rapid Test of Thickness of Tin Coating on Steel". Technical Publication of the International Tin Research and Development Council, Series A, No. 12, 1934, pp. 525 - 528.

12. A. Brenner, "Magnetic Method for Measuring Thickness of Non-Magnetic Coatings on Iron and Steel. U. S. Bureau of Standards Journal of Research Vol. 20, No. 3, March 1938, R. P. 1081 pp. 357 - 68.

13. D. J. MacNaughtan, S. G. Clarke, and J. C. Prytherch, "The Determination of the Porosity of Tin Coatings on Steel" JOURNAL IRON AND STEEL INST. Vol. 125, 1932, pp. 159 - 174. Also Tech. Pub. No. 7, Series A, Inst. Tin Research and Development Council.

14. W. H. Walker, "Detection of Pin Holes in Tin Plate". J. Ind. Eng. Chem. Vol. 1, No. 5, pp. 295 - 297, 1907.

15. National Canners Association Research Bulletin No. 22L.

Part I of this article was published in the May issue of WIRE & WIRE PRODUCTS and covered (1) Introduction, (2) Previous Work, and (3) Description of Steels Used and Preparation of the Tinned Samples of Each Steel.

✦ ✦ ✦

Part II of this article was published in the June 1942 issue of WIRE & WIRE PRODUCTS and covered testing of the tinned specimens and discussion of the results of these tests, including (1) Appearance of the Specimens after Tinning, (2) Metallographic Examination of Tin and the Iron-Tin Compound Layer.

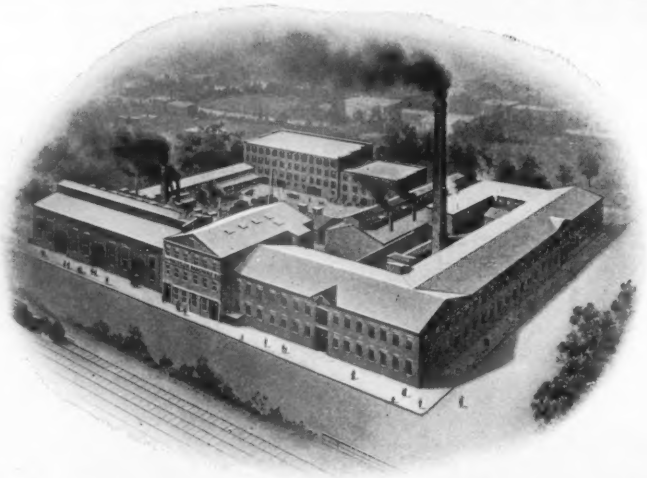
THE WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON, NEW JERSEY, U. S. A.

ELECTRICAL WIRE AND CABLE AND WIRE ROPE MACHINERY

Stranders
Bunchers
Cablers
Closers
Armor. Machines
Tapers
Juters
Serving Heads
Compound Tanks
Saturating Tanks
Powderers and Chalkers
Capstan Sections



Let-offs
Gang-Spoolers
Re-winders
Capstan Takeups
Continuous Takeups
Heavy-Duty Takeups
Traverses
Measuring Mach's.
Testing Mach's.
Vulcanizers
Polishers
Reel Crutches

MEAS. MACH'S. TRAVERSES, REEL CRUTCHES, BUNCHERS, SMALL POWDERERS, ETC. — USUALLY CARRIED IN STOCK

LITERATURE AVAILABLE ON ALL LISTED UNITS

The Wire Industry in War

(*Continued from Page 343*)

handicapped by knowing many things which aren't so. But you on the production front are not entirely free from 'blind spots.' It is so pitifully easy to criticize things we don't understand and resist anything we cannot direct or control.

✦ ✦ ✦

WE have made plenty of mistakes and been guilty of many sins of omission and commission—and will probably make more, but the job is everybody's job and criticism and recrimination does not increase production or win wars. Without your help, the efforts of the armed services are doomed to failure and conversely unless the armed forces successfully discharge their mission there may be little left for industry save enough life to pray for a speedy death.

✦ ✦ ✦

SO let's get together in the hard days to come as we have worked together in the past — toward our common objective. We must not weaken — we dare not fail! We have given our pledge before the World — we must and will make that pledge good.

**"Make good! Cut out 'if', 'could' and 'should'
And start in to saw wood.
We may still have the best things in life
Like the rest of the men who've achieved
Just because they believed in themselves.
You're deceived if you think fortune comes
With a ruffle of drums and a fanfare of state,
To hand yours on a plate,
That isn't the way that she visits today.
You must get out and rustle and bustle and hustle
You'll need all your muscle — for you've got to tussle.
Get into the fight—hit to left and to right
And keep crashing and smashing
Till things meet your liking.
For God's sake stop bawling
Instead, do some mauling.
It makes the world bitter to look at a quitter,
Fate scowls when she sees a grownup on his knees,
A man with his health,
Is a mine jammed with wealth
Full of unexplored lodes—why the freckled backed toads
Have the sense to keep jumping
And here we are frumping.
Come now! Strike your gait!
It's never too late—there's no such thing as fate.
Drop the fool talk of luck, get a grip on your pluck
And Buck!
Begin to grin—and Win!
"Herbert Kauffman"

✦ ✦ ✦

Catalog On Wire Cloth

THE Newark Wire Cloth Company, 365 Verona Ave., Newark, N. J., has just published a very complete catalog illustrating and giving specifications, definitions of terms, and other data on their woven wire screen and wire cloth products.

✦ ✦ ✦

THIS concern makes both standard and special wire cloths in any commercial size from filter cloths as fine as 120 per inch, to cloth with space openings 4" x 4". These are made in all malleable metals, including aluminum, brass, bronze, phosphor bronze, copper, monel, nichrome, nickel, galvanized tinned, stainless steel, gold, silver, platinum, lead, and spring steel.

✦ ✦ ✦

THE Company is equipped to render engineering service on special cloth requirements of customers not covered by their standard line. If interested ask for Catalog C.

CALLITE WIRES
...chosen for
Accuracy

Newark Standard Testing Sieves are widely used to grade and test many crushed and pulverized materials—ranging from diamond dust and pigments (400 mesh) to coarse stone (4" openings). Accuracy is the distinguishing feature of Newark's U. S. Standard Sieves.

Callite phosphor bronze wires (in diameters as small as .0038") are used in many of the finer Newark Sieves—eloquent evidence of the *dependable* uniformity in size, composition, temper and finish of Callite wires. If your problem involves fine alloy wires, Callite's long experience in precision and quality-controlled fine wire production is yours to command.

FREE: New Wall Chart of Standard Wire Gauges—diameters, physical properties of 15 alloys. On vest pocket card if preferred. Write for your copy.
Callite Tungsten Corporation, 550-39th Street,
Union City, New Jersey. Branches: Chicago, Cleveland.

CALLITE FINE WIRES

in sizes as small as .002" ... for springs, control cables, instruments, control devices, wire cloth, scratch brushes and other applications ... are furnished in these metals and alloys:

ALUMINUM	COMMERCIAL BRONZE	SILICON BRONZE
BERYLLIUM COPPER	EVERDUR	SILVER
BRASS — ALL GRADES	NICKEL-SILVER	SPECIAL ALLOYS
BRUSH WIRE	PHOSPHOR BRONZE	STAINLESS STEEL

Callite Wires

A FINE WIRE FOR EVERY NEED

CALLITE TUNGSTEN CORPORATION CT

A Review of Recent Wire Patents

Complete Descriptions and Drawings of Patents May Be Had for 25 cents. Address, Wire & Wire Products, 300 Main St., Stamford, Conn.

No. 2,281,542, CONDUCTOR, patented May 5, 1942 by William T. Barrans, Towson, and Paul M. Cole, Dundalk, Md., assignors to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

A retractile electric cord is provided, with the conductors helically coiled, one of the latter forming convolutions of greater diameter than another, the conductors, it is said, being unstressed in the retracted state of the cord.

✦ ✦ ✦

No. 2,281,756, WIRE CUTTER, patented May 5, 1942 by Clayton F. Fisher, Spencer, and Edward E. Franks, Jr., Worcester, Mass., assignors to Sleeper & Hartley, Inc., Worcester, Mass., a corporation of Mass.

Wire is fed continuously into the cutting machine in such a manner that when the advancing end of the wire reaches a predetermined position, it trips or releases a loaded trigger, which causes a clutch to force a power driven cutter to sever the wire.

✦ ✦ ✦

No. 2,283,042, MEANS FOR INTERCONNECTING ELONGATED FLEXIBLE MEMBERS IN PARALLEL, patented May 12, 1942 by John Joseph Burke, New Haven, Conn., assignor to The American Steel and Wire Company of New Jersey, a corporation of New Jersey.

✦ ✦ ✦

No sewing is necessary in interconnecting the wire ropes in parallel, with the interconnecting means within the structure.

✦ ✦ ✦

No. 2,243,116, SEAT CUSHION, patented May 12, 1942 by Leonard A. Young, Detroit, Michigan.

Next below the seat cover, is a rubber pad having air cells. In order to stabilize the pad and to increase its resiliency, resilient wire strips are moulded in the pad and connected to the frame of the cushion.

✦ ✦ ✦

No. 2,283,494, METHOD OF MAKING SCREW AND WASHER ASSEMBLIES, patented May 19, 1942 by Harvey C. Erdman, Shaker Heights, Ohio, assignor to The National Screw & Manufacturing Company, Cleveland, Ohio, a corporation of Ohio.

This method comprises rolling a helical thread on a portion of a headed blank and in the same operation rolling a continuous annular washer-retaining shoulder on the blank, the rolling of the helical thread and annular shoulder being done prior to the application of the washer to the screw and the rolled shoulder being somewhat higher than the rolled thread so that after the screw is completed a washer may be moved over the thread and shoulder and retained between the shoulder and the head of the screw.

✦ ✦ ✦

No. 2,283,878, METHOD FOR MAKING SCREEN CLOTH, patented May 19, 1942 by Richard D. Heller, Boise, Idaho.

In this method a number of convolutions of wire are wound on a reel to form a panel of screen cloth having a length sufficient to form a plurality of screen cloth sections, attaching end bars to opposite ends of the panel which form ultimate end bars for separate screen cloth sections, severing the wire convolutions between the end bars, removing the panel of screen cloth from the reel, thereafter tensioning the panel of screen cloth, attaching additional end bars and cross strips thereto to form screen cloth sections, and severing the wires between the additional end bars.

✦ ✦ ✦

No. 2,283,879 to 2,283,882, APPARATUS FOR MAKING SCREEN CLOTH, patented May 19, 1942 by Richard D. Heller, Columbus, Ohio.

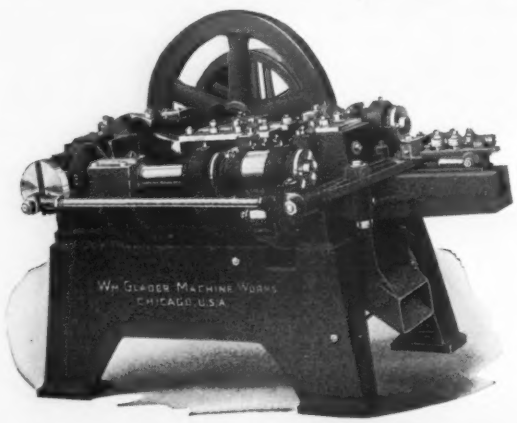
These patents cover patentable portions of the apparatus adapted to make the screen cloth as disclosed in the method of patent No. 2,283,878.

✦ ✦ ✦

No. 2,283,931, RUST PREVENTIVE COMPOUND, patented May 26, 1942, by Ernest R. Irwin, Dayton, Ohio.

More specifically, this compound is

GLADER WIRE NAIL MACHINE SCORES AGAIN



WM. GLADER MACHINE WORKS

210 N. Racine Ave. Chicago, Illinois

A new Wire Mill under construction in the State of Texas will install GLADER WIRE NAIL machines 100%.

The production figures on common nails shown below, are guaranteed.

SIZE MACH.	SIZE WIRE	MAX. LENGTH OF WIRE	NUMBER OF NAILS PER MIN.	CAP. IN POUNDS PER HR.
#00A	#16	1⅛"	700	37.2
#00	#14	1¼"	550	55
#0	#12	1¾"	450	89
#1	#10	2½"	400	192
#2	#8	3½"	325	310
#3	#4	5"	225	523
#4	#1	7"	190	622
#4s	5/16"	9"	175	1155
#5	⅜"	12"	160	2400

This high output and economical operation account for the GLADER machine being accepted as standard equipment in all recent installations.

adapted to be applied in the presence of any mineral oil adhering to the surface of the metal to be protected, and containing free acids resulting from the combustion of fuel or decomposition of lubricants; comprising a vehicle of castor oil so treated by heat as to render it miscible with mineral oil, and triethanolamine in an amount slightly in excess of the amount required to neutralize the acidity of the castor oil, the excess amount of triethanolamine being sufficient to neutralize free acids in the mineral oil adhering to the metal to be protected, said excess amount of triethanolamine being not more than 10% by weight of the composition and said composition being such that—when reduced with a thinner to a viscosity suitable for spraying—the resultant liquid will remain fluid at temperatures as low as 20 F.

✦ ✦ ✦

No. 2,284,115, ARMATURE WINDING MACHINE, patented May 26, 1942, by Otto Wirth, Zollikon, near Zurich, Switzerland, assignor to Micafil Ltd., Zurich, Switzerland, a joint stock company.

Means is provided, under control of a winding counter, for imparting step by step rotation to the armature about its axis after the completion of each winding operation to present an unwound set of slots to be wound and for restarting the driving means after each advancing step of the armature.

✦ ✦ ✦

No. 2,284,241, CORROSION INHIBITION, patented May 26, 1942, by James H. Werntz, Wilmington, Del., assignor to E. I. du Pont de Nemours & Company, Wilmington, Del., a corporation of Delaware.

Iron or steel is coated with a thin film consisting of an aliphatic acidester of a polycarboxylic acid, in which the aliphatic radical is a member of the group consisting of acyclic aliphatic, cyclohexyl and naphthenyl radicals and contains at least 6 carbon atoms, said ester consisting of the elements carbon, hydrogen and oxygen.

✦ ✦ ✦

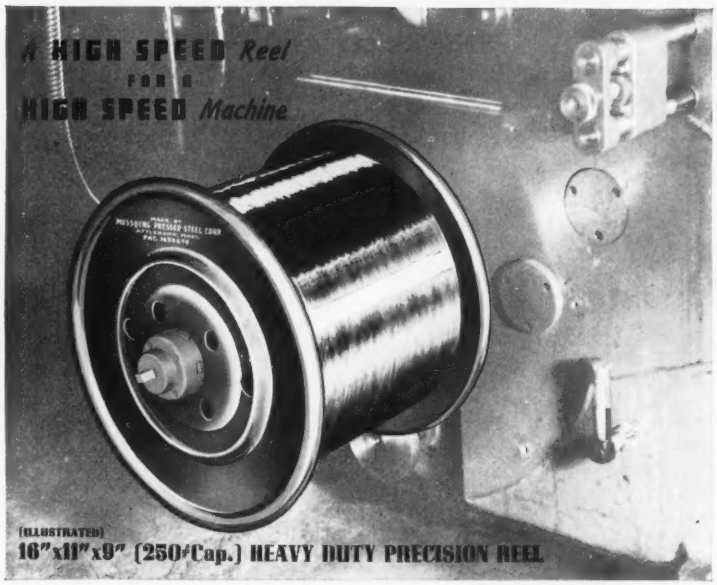
Niagara "No Frost" Cooling Unit Announced

COLD room air conditioners providing constant temperature as low as -50°F. to -80°F. are available for manufacturers who must test or normalize parts, materials and machinery at such temperatures, and for experimental laboratories. The NIAGARA "No-Frost" Method provides equipment for maintaining these low temperatures, and also for introducing fresh make-up air to these rooms at correct low temperatures, in rooms large enough for full scale testing.

✦ ✦ ✦

THIS new equipment, using Niagara "No-Frost" Liquid (no brine), gives constant operation without interruption or loss of capacity by reason of ice or frost forming on cooler coils or because of corrosion of the equipment from contact with brine or calcium. It consists of coolers operated in stages, the first stage reducing to temperature just above the freezing point of water and removing humidity, the second stage using the Niagara "No-Frost" Method to remove the balance of the moisture, and the third stage producing and holding the required final temperature.

MOISTURE is removed from the air below 32°F. without causing formation of ice on coolers by the Niagara "No-Frost" Method, which employs a special non-freezing liquid continuously re-concentrated in a Niagara concentrator designed especially for this duty. The Niagara "No-Frost" Method and coolers are manufactured by the **Niagara Blower Co.**, 6 E. 45th St., New York City.



MOSSBERG PRESSED STEEL CORP.

OFFERS: BALANCED PRECISION REELS

in HEAVY DUTY construction for use on modern HIGH SPEED wire drawing machines.

To provide higher operating efficiency, with the ever increasing tendency towards the drawing of finer gauge wire on larger reels at higher speeds, the following reel requirements are now essential:

(1) PROPER PROPORTION
(2) BALANCE
(3) ACCURACY
(4) STRENGTH
(5) DURABILITY

All these requirements are incorporated in spools & reels made by

MOSSBERG PRESSED STEEL CORP.

18 WEST STREET ATTLEBORO, MASS., U. S. A.

Outstanding Personalities of the Wire Industry

American Steel & Wire Company Personnel Changes

GEORGE H. BENDELL has been appointed superintendent of factories at Joliet, Ill., Works of the American Steel and Wire Co., subsidiary of the U. S. Steel Corp. At the same time **Henry W. Spitzhoff** has been named superintendent of the wire mill at Joliet.

✦ ✦ ✦

MR. BENDELL'S employment with the U. S. Steel Corp. began in July, 1907, as a clerk with the Illinois Steel Co. In November, 1936, he was transferred to the American Steel & Wire Co. as assistant superintendent at Waukegan, and in September of the following year was made superintendent. In May, 1941, he was appointed assistant general superintendent at Joliet.

MR. SPITZHOFF has been with the Wire Company since January, 1937, when he started as Cleveland district industrial engineer. In April of the same year he was made assistant chief industrial engineer, and in June, 1938, was appointed chief industrial engineer of the company.

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AT the Donora Plant, **Harold Cope,** assistant general superintendent of the steel and wire works has been named division metallurgist at the Cleveland offices and **John A. Slenker,** whom Mr. Cope is succeeding, has been named superintendent of the steel works in Worcester, Mass.

✦ ✦ ✦

REPLACING Mr. Cope at Donora, **Loren J. Westhaver,** formerly superintendent at Worcester, has been transferred to Donora.

Nopco Personnel Changes

E. J. BARTH, petroleum technologist, of Three Rivers, Texas, has just joined the Research and Development staff of National Oil Products Company, Harrison, N. J., manufacturers of wire drawing lubricants, it was announced by **G. Daniel Davis,** vice president in charge of Market Research and Product Development.

✦ ✦ ✦

MR. BARTH, who is a graduate of Columbia University, has several patents to his credit in the field of chemistry.

✦ ✦ ✦

DR. Donald Price, technical director of the Organic Research Laboratories at the National Oil Products Company plant in Harrison, N. J., has been elected to the Executive Committee of the American Section of the Society of Chemical Industry.

Hotel Carter

THE WIRE ASSOCIATION OFFICIAL HEADQUARTERS

October 12-17, 1942

Cleveland's leading Convention Hotel and gathering place for world famed personages.

Chosen by THE WIRE ASSOCIATION

BECAUSE: THE CARTER houses the famous RAINBOW ROOM and twenty-five other individually styled meeting rooms.

BECAUSE: All bedrooms and suites are beautifully appointed.

BECAUSE: It is noted for fine food and attentive service.

May we advise THE WIRE ASSOCIATION members to make early and direct reservation with THE CARTER.

ALLEN JAMES LOWE
PRESIDENT - MANAGING DIRECTOR

WILLARD I. CURTIS
SALES MANAGER

Herman W. Steinkraus, President, Bridgeport Brass Company

FORMERLY vice president and general manager, **Herman W. Steinkraus,** has been elected president of Bridgeport Brass Company, succeeding **Ralph E. Day,** who has resigned because of ill health.

✦ ✦ ✦

MR. DAY will continue as a director of the Company.

✦ ✦ ✦

C. W. Spittal, Gen. Manager, Allegheny-Ludlum Steel Corp., Dunkirk, N. Y.

IT has recently been announced that **C. W. Spittal** and **W. R. Breeler** have been appointed general manager and assistant general manager, respectively, at the Dunkirk plant of the Allegheny Ludlum Steel Corp.

✦ ✦ ✦

ALSO, the following changes were announced: **C. Cottrell** has been named production manager of the Howard Avenue Plant at Dunkirk; **Merle Graham,** production manager of the Brigham Road Plant at Dunkirk; **W. H. Norris,** Manager, Watervliet, N. Y., plant; **J. Q. A. Doolittle,** assistant manager at Watervliet and **G. Anderson,** production manager at the same plant.

✦ ✦ ✦

Personnel Changes in Jones & Laughlin Sales Staff

THE Jones & Laughlin Steel Corp., of Pittsburgh, Pa., has announced the following changes in the sales department.

✦ ✦ ✦

V. A. JEVON and **A. J. Hazlett** have been appointed assistant general managers of sales, **Clarence C. Wehling** has been named assistant district sales manager at Pittsburgh and **F. H. Davidson** has become assistant manager of sales of the hot rolled sales department.

✦ ✦ ✦

MR. JEVON has been assistant to vice president in charge of sales since October, 1938 while Mr. Hazlett has been manager of the strip-sheet sales department since 1938.

Wheelco Appoints District Representatives

WHEELCO Instruments Co., Chicago, has announced the appointment of four new district representatives. The Pasol Engineering Company, has been named Iowa and Nebraska representative, with **V. E. Lindquist** in charge of the Iowa office at Des Moines, and **I. I. Solzman** heading the Nebraska office in Omaha. Fitzgerald, Inc., Wichita, has been assigned the Kansas territory, with **Bloyce Fitzgerald** in charge of instrument sales. **Charles A. Drum,** Houston, has been named Texas district manager.

✦ ✦ ✦

Robert C. Onan, Sales Manager, Lindberg Engineering Company

ROBERT C. ONAN, of the Lindberg Engineering Company of Chicago, has been appointed District Sales Manager for the Northern Illinois, Iowa, Wisconsin, and Minnesota territory. The newly opened Lindberg office is at 606 West Wisconsin Avenue in Milwaukee.

SAVE ZINC

Save scarce metal and cut down waste in your hot galvanizing of wire and pipe by using

DEWALCO LIQUID BLANKET

★ PREVENTS FORMATION OF ZINC OXIDE

★ CUTS HEAT LOSSES

★ REDUCES DROSS

Successful use for more than a year has proved its worth. We don't claim it will produce the same results in every operation, but its record shows that it may help you. Isn't it worth a trial? Write for details today.

SAVE ZINC — USE DEWALCO LIQUID BLANKET

DEWEY AND ALMY CHEMICAL COMPANY • CAMBRIDGE, MASS.

Definitions of Electrical Terms

THE American Institute of Electrical Engineers, to iron out difficulties arising that often develop due to a lack of accepted and standardized terms for the multitude of products in the electrical industry, has just completed a 300-page book, 8″ x 11″ in size, sturdily bound in fabricord covers, through which terms in use in Canada and the United States are unified and clarified.

IT is hoped that through this work an important step in the advancement of the electrical art will result. Over 300 experts from representative organizations and companies in the electrical field have cooperated over a twelve-year period to produce this standardization of terms, as it covers all branches of the electrical industry.

✦ ✦ ✦

PRIOR to the inception of the work of compiling these definitions there were few definitions, they were widely scattered, and as they were the work of small groups or individuals, these definitions were not always uniform. Besides giving definitions, much valuable data, many formulae and a detailed index is included.

✦ ✦ ✦

TO make possible the wide dissemination of this book in the interest of standardization a nominal price of $1.00 has been placed on it ($1.25 outside the U.S.A.) and copies may be had by remitting the purchase price direct to the Institute's headquarters at 33 West 39th St., New York, N. Y.

✦ ✦ ✦

Bulletin On Care of Floors

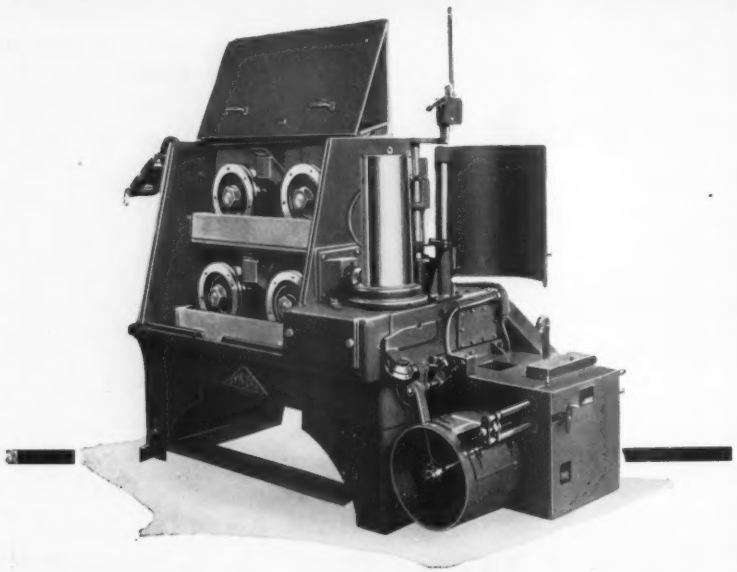
THE Magnus Chemical Company, Inc., manufacturers of industrial cleaning materials, emulsifying agents and wire drawing lubricants, has just issued a 24-page Technical Bulletin entitled "The Cleaning Of Industrial Floors."

✦ ✦ ✦

THIS bulletin, No. 62, has been written not only from the viewpoint of cleaning floors for personnel safety by the elimination of greasy, slippery floors, but from that of cleaning floors for longer floor life. It provides the one in charge of floor maintenance with a guide to the selection of the proper type of cleaning material best suited to his floors.

✦ ✦ ✦

THE bulletin covers the cleaning of practically every type of flooring material used in buildings, from industrial plants to hotels, and discusses: Concrete, wood, painted or varnished, linoleum, cork tile, rubber and terrazzo. Some of the other subjects



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Extremely flexible, this machine is equipped with a coiler and a spooler, and the changeover from one to the other is easily and quickly effected.

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Represented in Canada by — Canadian Elevator Equipment Co. Ltd., Toronto

are headed: "Why Clean Floors", "The General Problem of Floor Cleaning", "What Does a Floor Cleaner Have to Do", "Suspension of Dirt", and "Rinsing".

✦ ✦ ✦

A COPY of this new Bulletin, No. 62, can be obtained by writing to the **Magnus Chemical Company, Inc.**, Garwood, N. J. Mention of Wire & Wire Products would be appreciated.

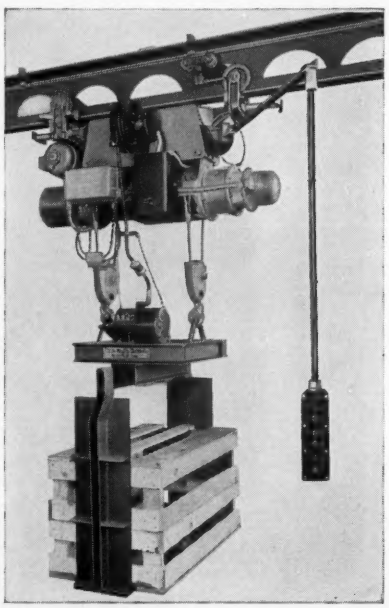
✦ ✦ ✦

Motor-Driven Crate Grab and Carrier

ONE of the newest developments of the Cleveland Tramrail Division of The Cleveland Crane & Engineering Co., Wickliffe, Ohio, is the motor-driven crate grab and carrier designed to handle crates and boxes in and out of storage, or from one elevation to another. The unit enables the quick stacking or removal of crates at a great height with safety. This makes possible faster handling, and also greater storage capacity for a given area.

✦ ✦ ✦

THE grab and carrier are completely motorized, with all operations controlled by the six buttons of the push-button station.



If desired, this type unit can be equipped with an operator's cab in which all controls may be located.

THE arms of the grab are extended and retracted by means of geared slide bars that are driven by the motor mounted on top of the grab. Power is supplied to this motor through a flexible cable that is held taut by a spring-type retrieving reel.

✦ ✦ ✦

A DOUBLE-HOOK cable type electric hoist elevates and lowers the grab with very little swing, making it easy to spot it as desired. A quick acting electric brake stops and holds the load wherever desired.

✦ ✦ ✦

THE unit illustrated will handle one or more boxes at a time. It will lift loads up to 1500 lbs. a distance of 20 feet. The arms may be spread to a maximum of 36 inches and retracted to a minimum of 18 inches. Similar units can be built for heavier loads and for crates and boxes of other dimensions.

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Zinc Coating on Wire

(*Continued from Page 349*)

ing. These tests may be of a simple or of a complex nature. Most anything desired by the investigator can be proven by using the spray test. Another instance follows. It is often claimed that pure zinc, to be specific an electrogalvanized coating is more corrosion resistant than a hot dip coating. To demonstrate the two coated wires are immersed in dilute sulfuric acid, where the above statement is true. While the electrogalvanized wire may be corrosion resistant in the atmosphere of Chicago(7) the hot dip coating is more resistant in the atmosphere of Pittsburgh(7) and New York(32). In the Pittsburgh district heat treated hot galvanized coatings with .35 oz./sq. ft. coating appeared to last as long as an electrogalvanized .70 oz./sq. ft. coating. An approximately .45 oz./sq. ft. plain hot dip coating would appear to last as long as the above electrogalvanized coating. Therefore, it is necessary to emphasize the "atmosphere index", when comparing the corrosion resistance of hot galvanized and electrogalvanized coatings. In a rural atmosphere the electrogalvanized coating may have greater life, provided it has very good uniformity and the coating has no pinholes. At the pinholes the portection of zinc is of a sacrificial nature, and the corrosion of zinc proceeds faster than where it is only corroded chemically by solution in water.

✦ ✦ ✦

Conclusion

THE coating of steel hinges on a few fundamental operations whose object is to produce a chemically clean surface to which will adhere firmly a coating. This coating may be finished according to the demands of the trade.

✦ ✦ ✦

IMPROVEMENTS are being made in hot dip galvanizing by obtaining a better knowledge of the effect of molten zinc on steel, and the effect of elements dissolved in the zinc. The knowledge of the iron-zinc diagram permits

a better understanding of the problems involved. From the technical standpoint. Improvements are being made to reduce the waste of dross and zinc skimmings; reduce the waste of wire by reducing "reachers" by welding the wire instead of joining by hand as is usual; the acid consumption may be reduced by using appropriate wetting agents whose effect is not detrimental to the subsequent activation and coating operations. Zinc shows its maximun ductility in a certain direction—it may be possible to orient the zinc layers.

✦ ✦ ✦

FOR electrogalvanizing wire cheap power is necessary; the possibility of using complex zinc ores and possible waste materials, removal of impurities, control and contacts are problems which require solution. Addition agents to help orient zinc crystals, and so obtain maximum ductility in the coating, have shown promise. Methods of preparation and activation of the surface to make the bond zinc coating—steel foolproof are still desirable.

✦ ✦ ✦

ON working on all these problems it is necessary to remember that the various steps must be so designed that enough time is allowed for preparation, activation and coating the wire. all of which take place continuously, because of the suitability of wire for continuous handling.

✦ ✦ ✦

Appendix

SOME months ago the demands of National Defense put a premium on the metal zinc which could be used for galvanizing. With War the demand for zinc for the above purpose is even greater. Therefore it is necessary to use the coating best suited for the occasion using the minimum amount of zinc. As for Civilian uses, wherever necessary substitutes must be used. Some studies have been made and reports have been issued. Some of the conclusions may have to be revised before much time elapses. The Committee of the **American Iron**

(*Please turn to Page 370*)

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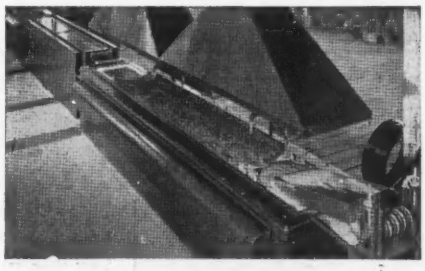

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Zinc Coating on Wire

(*Continued from Page 369*)

and Steel Institute(33) recommended last November that wire products be furnished as at present as long as coating metal was available. On the other hand, it has been recommended that galvanized wire screen (1 inch mesh) used in reinforcing stucco for home construction be painted(34). The allies have been concerned with the matter of substitutes of coatings as is attested by their reports(35). The Bureau of Industrial Conservation in Washington has also issued a report on materials suitable for replacing zinc coatings(36).

✦ ✦ ✦

References

1. H. P. Munger, Iron and Steel Eng. vol. 16, February 1939, p. 58.
   H. P. Munger, Trans. Electrochem. Soc. vol. 69, p. 85 (1936).
   L. B. Pfeil, Jl. Iron and Steel Inst. (London) vol. 119, p. 501, (1929) and vol. 123, p. 237 (1931).
2. Handbook, American Society for Metals, 1939 ed. p. 1139-1141.
3. American Machinist, vol. 80, p. 828, (1940).
4. T. Sendzimir, U. S. Patent 2,110,893 (1938); H. R. Hanley, Metal Progress 37, 433 (1940).
5. J. C. Redmond and R. W. Hodil, U. S. Patent 2,199,418 (1940).

5.b. J. L. Bray, Non Ferrous Production Metallurgy, 1941, p. 340.

5.c. E. D. Martin, U. S. Patent 1,770,-177; also Calibron Notebook, Vol. 4, Dec. 1937.

6. E. H. Lyons, Trans. Electrochem. Soc. 78, 317 (1940).
7. E. H. Lyons, Trans. Electrochem. Soc. Prep. 80-16 (1941).
8. U. C. Tainton, Wire and Wire Products 9, 399 (1934).
9. C. G. Fink & T. H. Wilbur, Trans. Electrochem. Soc. 66, 381, (1934).
10. V. P. Sacchi, Korrosion & Metallschutz, 15, 321, (1939).
11. T. H. Hoare, Trans. Electrochem. Soc. 78, 332 (1940).
12. S. O. Cowper Coles, U. S. Patent 979,931.
13. R. W. Sandelin, Wire and Wire Products, 15, pp. 655, 721 (1940) vol. 16, p. 28, 55 (1941).
14. R. W. Sandelin, Wire and Wire Products, 16, 567 (1941); 17, p. 33 (1942).
15. Scheil & Wurst, Zt. f. Metallkunde, 29, 228 (1937).
16. F. R. Morral and E. P. Miller, Trans. A.I.M.M.E. Inst. of Metals Div. Vol. 143, p. 158 (1941) also Metals Technology, Sept. 1940, T. P. No. 1224; Wire and Wire Products 16, 332 (1941).
17. F. R. Morral and H. J. Yearian, Metals and Alloys, 12, 54 (1940).
18. Steel, May 3, p. 42 (1937).
19. The Iron Age, May 13, p. 48 (1937).
20. Steel, Dec. 24, p. 22 (1934).
21. The Iron Age, April 23, p. 44 (1936).

22. U. C. Tainton, Jl. of the American Zinc Institute, 18, 42, (1937).
23. L. H. Winkler, Wire and Wire Products. 16, 687 (1941).
24. J. L. Bray and F. R. Morral, Electrochem. Soc. Prep. 80-17 (1941).
25. J. L. Bray and F. R. Morral, Trans. Electrochem. Soc. 78, 309 (1940).
26. J. L. Schueler, Trans. Electrochem. Soc. 47, 201, (1925).
27. Proc. Amer. Soc. of Test. Mat. 39, 103 (1939).
28. Proc. Amer. Soc. Test. Mat. Prep. 8, (1941).
29. J. B. Austin, Amer. Soc. Test. Mat. Prep. 37 (1941).
30. A. Weisselberg, Metal Industry, 34, 168 (1936).
31. L. Kenworthy, The Inst. of Metals (London) 61, 143 (1937).
32. R. M. Burns & A. E. Schuh, Protective Coatings for Metals, (1939) p. 100.
33. Contribution to the Metallurgy of Steel. No. 4. The American Iron and Steel Inst. Nov. 1941.
34. E. F. Hickson, Steel, vol. 110, Jan. 12, p. 74 (1942).
35. Protective Coatings Sub Committee. The Iron and Steel Institute (London) Adv. copy, Dec. 1941.
36. Specifications Bureau, 1942.

Part I of this article was published in the June 1942 issue and discussed the fundamental operations necessary to make a coated wire to specification together with a consideration of possibilities of improvement in methods now in use.

The Jetal Process

A NEW booklet has been released by the Alrose Chemical Company on the Jetal process, by which ferrous metals may be given a black oxide coating that provides a corrosion resistant surface as well as an attractive black finish.

✦ ✦ ✦

THIS booklet contains an illustrated description of the process, based on data drawn from their research files, describing the effect of treatment time, bath temperature, bath composition and surface hardness on the protective value, penetration and wear resistance of the oxide coatings.

✦ ✦ ✦

AS this process has been used successfully by a number of wire and wire products manufactures, it may be of wide interest to our field. A copy of "The Jetal Process" may be had by addressing the **Alrose Chemical Company,** Providence, R. I.

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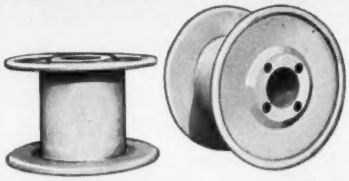

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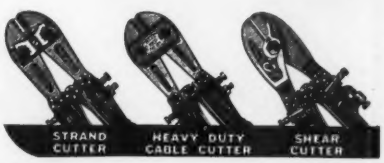

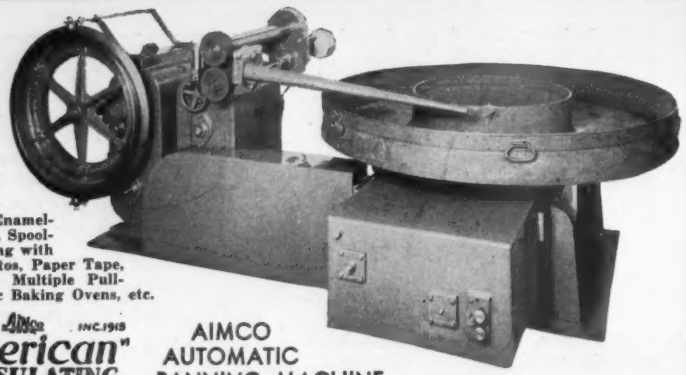

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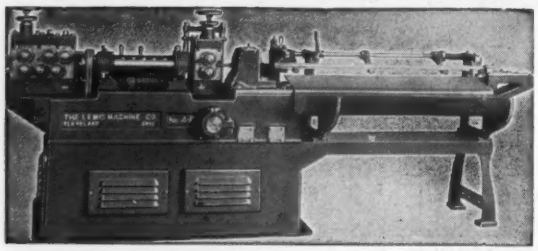

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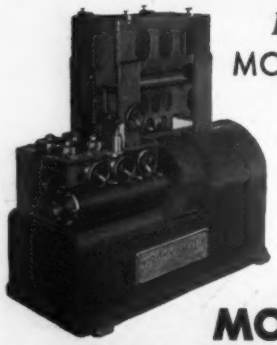

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Wall Chart of Wire Data

A WALL chart which incorporates much basic and frequently used wire data is being offered without charge by the **Callite Tungsten Corporation** of engineers and specifiers of wire and wire products.

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THE data presented consists of three tables. The first of these gives wire diameters for all sizes from 1 to 50 in B & S, Washburn & Moen, and Stubs (or Birmingham) gauges, and in addition includes feet per pound for each size in the B & S gauge. These latter figures are given for 5% phosphor bronze wire. The second table supplies the conversion factors to simplify calculating feet per pound for wire of 15 different common metals and alloys. Third is a table showing the composition and physical properties of this same group of metals and alloys.

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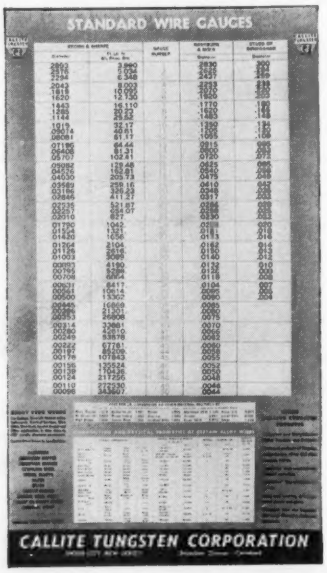

THE chart is approximately 36 inches high by 21 inches wide—amply large to make its main table readable from a considerable distance. It is lithographed in two colors on heavy paper stock, bound top and bottom with metal.

✦ ✦ ✦

ENGINEERS and others having use for one of these charts may obtain same by addressing a request to the company at Union City, New Jersey. There is no charge or obligation involved.

Convention Reservations

THE Hotel Carter has been selected as the Wire Association headquarters for the Annual Convention to be held at Cleveland, Ohio, October 12-16, 1942.

✦ ✦ ✦

HOWEVER, because of the pressure on the Cleveland hotels for rooms this Fall, to be sure of securing accommodations at the Convention hotel it is necessary for your reservation to be in the hands of the Hotel people prior to September 30th, 1942.

✦ ✦ ✦

AFTER September 30th, 1942, all reservations will be submitted by the various hotels to the Central Housing Bureau of the Cleveland Hotel Association and the Hotel Association will then assign the reservations to such hotels as may have space open.

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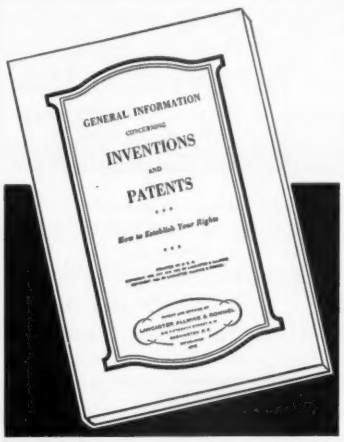

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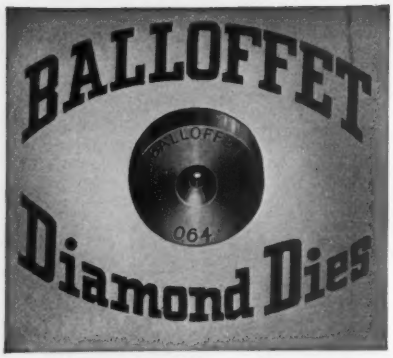

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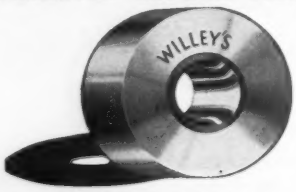

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✦ ✦ ✦

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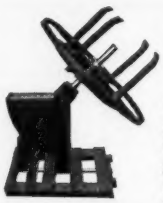

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"Plant Efficiency"

A BOOKLET on plant efficiency has been published by the Division of Information, War Production Board, and is now available for distribution, on request.

✦ ✦ ✦

THE booklet is called "PLANT EFFICIENCY — Ideas and Suggestions on Increasing Efficiency in Smaller Plants".

✦ ✦ ✦

IT is in simple terms and is designed primarily for smaller war plants or for plants which are just getting into war production and which might be able to increase production by a study of efficiency procedures.

✦ ✦ ✦

CHAPTERS in the booklet deal with "Good Lighting—Better Work"; "Cutting Down Accidents"; "Adapting Old Machines to New Jobs"; "Maintenance and Repair"; "Longer Life for Cutting Tools"; "Getting the Most Out of Machine Tools"; "Production Lines Geared for War"; "Meeting Government Standards"; "Training Workers Quickly"; "Swing Shifts"; "Keeping Track of Orders, Production, and Materials"; "Plant Protection"; "Pooling Facilities"; "A Word On Priorities", and "Getting Into War Work".

✦ ✦ ✦

COPIES may be obtained from regional and local offices of the War Production Board, located in 120 cities; from local offices of the Division of Information, Office for Emergency Management; or by writing to the Division of Information, Office for Emergency Management, in Washington.

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✦ ✦ ✦

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Norton Co., Worcester, Mass.

AIR DRAW FURNACES—
Carl-Mayer Corp., The, Cleveland, Ohio

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Syncro Machine Co., Rahway, N. J.

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Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.

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New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

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Carl-Mayer Corp., The, Cleveland, Ohio

BAKERS—Rod and Wire
Carl-Mayer Corp., The, Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
Moslo Machinery, Inc., Cleveland, Ohio
Ross, J. O., Engineering Corp., New York, N. Y.

BENDERS—
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

BERYLLIUM COPPER—Strip and Bars
Callite Tungsten Corp., Union City, N. J.

BOBBINS—Braider and Wire Weaving
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

BORON CARBIDE—
Norton Co., Worcester, Mass.

BRAKES AND SHEARS—
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

CARRIERS—Braider, High Speed
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.

CEMENTS—Refractory
Norton Co., Worcester, Mass.

CHEMICALS—Cleaning
American Chemical Paint Co., Ambler, Pa.
Oakite Products, Inc., New York, N. Y.
Parkin, Wm. M., Co., Pittsburgh, Pa.
Standard Industrial Compounds Co., Chicago, Ill.

CLEANERS—Hand and Metal
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

CLEANING & PICKLING EQUIPMENT—
Broden Construction Co., Cleveland, Ohio
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CLOTH TESTERS—
Scott, Henry L., Co., Providence, R. I.

CLOTH—Wire, All Metals
Callite Tungsten Corp., Union City, N. J.

COATING—Protective
American Lanolin Corp., Lawrence, Mass.

COILERS—Sheet, Strip and Wire
Broden Construction Co., Cleveland, Ohio
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Manufacturing Co., The, Torrington, Conn.

COLD HEADERS—
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

COMPOUNDS—Coppering
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Wire Drawing
Oakite Products, Inc., New York, N. Y.
Richards, G. Whitfield, Philadelphia, Pa.
Standard Industrial Compounds Co., Chicago, Ill.

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Niagara Blower Co., Buffalo, N. Y.

CONTROLS—Temperature
Niagara Blower Co., Buffalo, N. Y.

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Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

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Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CUSTOM WIRE DRAWING—
Hy-Carbo Steel Co., Lowell, Mass.

CUTTING TOOLS—Carbide
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Vascoloy-Ramet Corp., North Chicago, Ill.

CUTTING TOOLS—Wire
Porter, H. K., Inc., Everett, Mass.

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Callite Tungsten Corp., Union City, N. J.

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Indiana Wire Die Co., Fort Wayne, Ind.
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Krause, F., & Co., Hillside, N. J.
Rusch Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIES—Lead Extrusion
Robertson, John, Co., Brooklyn, N. Y.

DIES—Repairs & Re-Cutting
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Carboloy Co., Inc., Detroit, Mich.
Cochaud Wire Die Corp., New York, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Krause, F., & Co., Hillside, N. J.
Rusch Wire Die Corp., New York, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Rod & Tube Drawing
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Tungsten Electric Corp., Union City, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

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Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Tungsten Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Tungsten Electric Corp., Union City, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
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Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Standard Machinery Co., Providence, R. I.
Vaughn Machinery Co., Cuyahoga Falls, O.

DRUMS—Flange Steel
Stevens Metal Products Co., Niles, Ohio

DRUMS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

DRYING EQUIPMENT—
Niagara Blower Co., Buffalo, N. Y.

ENGINEERS—Consulting Wire Mill
Hartley, George D., Worcester, Mass.
Lewis, Kenneth B., Worcester, Mass.

EQUIPMENT—Humidifying
Niagara Blower Co., Buffalo, N. Y.

EQUIPMENT—Industrial Cooling
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Platt Bros. & Co., The, Waterbury, Conn.

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Carl-Mayer Corp., The, Cleveland, Ohio

FLUX—Galvanizing
Dewey & Almy Chemical Co., Cambridge, Mass.

FLUXES—Soldering
American Chemical Paint Co., Ambler, Pa.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.

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Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.
Trauwood Engineering Co., Cleveland, Ohio

FURNACES—Automatic
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio

FURNACES—Brazing
Electric Furnace Co., Salem, Ohio
Firth-Sterling Steel Co., McKeesport, Pa.

FURNACES—Bright Annealing
Electric Furnace Co., Salem, Ohio
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio

FURNACES—Electric
Electric Furnace Co., Salem, Ohio
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio
Trauwood Engineering Co., Cleveland, Ohio

FURNACES—Hardening & Tempering
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio
Trauwood Engineering Co., Cleveland, Ohio

FURNACES—Lead Melting
Electric Furnace Co., Salem, Ohio
Robertson, John, Co., Brooklyn, N. Y.

FURNACES—Non-Oxidizing
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio

FURNACES—Normalizing
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio

FURNACES—Salt Bath
Electric Furnace Co., Salem, Ohio
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.

FURNACES—Wire, Strip & Sheet
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio.

GALVANIZING FLUX—
Dewey & Almy Chemical Co., Cambridge, Mass.

GALVANIZING KETTLES—
National Annealing Box Co., Washington, Penna.

GRINDERS—Roll
Norton Co., Worcester, Mass.

HI-SPEED BAKERS—
Carl-Mayer Corp., The, Cleveland, Ohio

HOISTS—Electric Travelling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

INHIBITORS—
American Chemical Paint Co., Ambler, Pa.
Parkin, Wm. M., Co., The, Pittsburgh, Pa.

KETTLES—Galvanizing, Annealing, Tinning, etc.
National Annealing Box Co., Washington, Penna.

LATHES—Die Reaming
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

LIME—
Warner Co., Bellefonte, Pa.

LIQUID FOAM BLANKET—
Dewey & Almy Chemical Co., Cambridge, Mass.

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Miller, R. M., Co., Inc., Homer, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

LUBRICANTS—Wire Drawing
Bick, Hans C., Inc., Reading, Pa.
Miller, R. M., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Richards, G. Whitfield, Philadelphia, Pa.
Standard Industrial Compounds Co., Chicago, Ill.

MACHINERY—Armoring (Cable, Wire Hose)
American Insulating Mach'y. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Robertson, John, Co., Brooklyn, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Braiding
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Watson Machine Co., Paterson, N. J.

MACHINERY—Brazing
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.

MACHINERY—Bunching
American Insulating Mach'y. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cable, Electric
American Insulating Mach'y. Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Chain Making
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Closing
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coil Winding
Robinson Mfg. Co., Muncy, Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Coilers
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
New England Butt Co., Providence, R. I.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Copper Wire Drawing and Rolling
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Rahway, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire
Fidelity Machine Co., Philadelphia, Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Cutting
Broden Construction Co., Cleveland, Ohio
Lewis Machine Co., The, Cleveland, Ohio
Moslo Machinery, Inc., Cleveland, Ohio
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Shuster, F. B., Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Manufacturing Co., The, Torrington, Conn.

WHERE TO BUY, Continued

MACHINERY—Die Making
Firth-Sterling Steel Co., McKeesport, Pa.

MACHINERY — Die Making for Forming Special Shapes
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

MACHINERY—Draw Benches
Standard Machinery Co., Providence, R. I.
Torrington Manufacturing Co., The, Torrington, Conn.

MACHINERY—Edging
Standard Machinery Co., Providence, R. I.
Torrington Manufacturing Co., The, Torrington, Conn.

MACHINERY—Enameling
American Insulating Mach'y. Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Extruding
National Erie Corp., Erie, Pa.
Robertson, John, Co., Brooklyn, N. Y.
Royle, John, & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Flat Wire
Broden Construction Co., Cleveland, Ohio
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Manufacturing Co., The, Torrington, Conn.

MACHINERY—Forming
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Torrington Manufacturing Co., The, Torrington, Conn.

MACHINERY—Galvanizing Wire
Broden Construction Co., Cleveland, Ohio
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Gang Winders
Fidelity Machine Co., Philadelphia, Pa.
Robinson Mfg. Co., Muncy, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., The, Worcester, Mass.

MACHINERY—Insulating
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
National Erie Corp., Erie, Pa.
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Knitting
Fidelity Machine Co., Philadelphia, Pa.

MACHINERY—Lead Encasing Presses, etc.
Robertson, John, Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
Robertson, John, Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Manufacturing Co., The, Torrington, Conn.

MACHINERY—Magnet Wire
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Manufacturing Co., The, Torrington, Conn.

MACHINERY—Material Handling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

MACHINERY—Measuring Wire & Cable
Davis, R. L., Electric Co., Wallingford, Conn.
Durant Mfg. Co., Milwaukee, Wis.
Lyon-Vail Machine Co., Inc., Brockton, Mass.
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Glader, Wm., Machine Works, Chicago, Ill.
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Panning
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Pointing
Broden Construction Co., Cleveland, Ohio
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Torrington Manufacturing Co., The, Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Quill Winding
Fidelity Machine Co., Philadelphia, Pa.

MACHINERY—Rod Mill
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.

MACHINERY—Rolling Mill
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Torrington Manufacturing Co., The, Torrington, Conn.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Rubber for Insulating Wire
National Erie Corp., Erie, Pa.
Royle, John, & Sons, Paterson, N. J.

MACHINERY—Rubber Strip Covering
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Rubber Tubing and Straining
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Manufacturing Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Screw Wire
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Special
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, Ohio
Emory, Robert J., Co., Newark, N. J.
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I. (Special Designs)
Syncro Machine Co., Rahway, N. J.
Torrington Manufacturing Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spooling
American Insulating Mach'y Co., Phila., Pa.
Emory, Robert J., Co., Newark, N. J.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Manufacturing Co., The, Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spring Making
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Manufacturing Co., The, Torrington, Conn.

MACHINERY—Straightening
Broden Construction Co., Cleveland, Ohio
Lewis Machine Co., The, Cleveland, Ohio
Moslo Machinery, Inc., Cleveland, Ohio
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Shuster, F. B., Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Manufacturing Co., The, Torrington, Conn.

MACHINERY—Stranding
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Broden Construction Co., Cleveland, Ohio
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Manufacturing Co., The, Torrington, Conn.

MACHINERY—Swaging
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Testing
Robinson Mfg. Co., Muncy, Pa.
Scott, Henry L., Co., Providence, R. I.

MACHINERY—Testing Size of Wire
Davis, R. L., Electric Co., Wallingford, Conn.

MACHINERY—Testing Spring
Standard Machinery Co., Providence, R. I.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.
Torrington Manufacturing Co., The, Torrington, Conn.

MACHINERY—Trolley Wire
Torrington Manufacturing Co., The, Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Manufacturing Co., The, Torrington, Conn.

MACHINERY—Welding Wire
Micro Products Co., Chicago, Ill.
Shuster, F. B., Co., New Haven, Conn.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.

MACHINERY—Winding
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Manufacturing Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Bending
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

MACHINERY—Wire Drawing
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Robinson Mfg. Co., Muncy, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Wire Measuring
Durant Mfg. Co., Milwaukee, Wis.
Lyon-Vail Machine Co., Inc., Brockton, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

WHERE TO BUY, Continued

MACHINERY—Wire Tinning
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Wood Screw
National Machinery Exchange (Used), New York, N. Y.

MATERIAL HANDLING EQUIPMENT
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

MILLS—Tandem Rolling and Edging
Standard Machinery Co., Providence, R. I.
Torrington Manufacturing Co., The, Torrington, Conn.

NICKEL SILVER AND PHOSPHOR BRONZE—Rod, Wire and Strip
Hudson Wire Co., Ossining, N. Y.

OILS—Wire Drawing
Richards, G. Whitfield, Philadelphia, Pa.
Standard Industrial Compounds Co., Chicago, Ill.

OVENS—Industrial
Carl-Mayer Corp., The, Cleveland, Ohio
Ross, J. O., Engineering Corp., New York, N. Y.

PANS—Lead and Spelter
National Annealing Box Co., Washington, Penna.

PANS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

PAPER—Creped Wrapping
Crepe-Kraft Co., Newark, N. J.

PAPER TESTERS—
Scott, Henry L., Co., Providence, R. I.

PATENT ATTORNEYS—
Lancaster, Allwine and Rommel, Washington, D. C.

PICKLING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Parkin, Wm. M., Co., Pittsburgh, Pa.

PLASTIC TESTERS—
Scott, Henry L., Co., Providence, R. I.

POTS—Lead Melting
Robertson, John, Co., Brooklyn, N. Y.

POWDER—Wire Drawing
Richards, G. Whitfield, Philadelphia, Pa.

PRESSES—Hydraulic and Mechanical
Robertson, John, Co., Brooklyn, N. Y.
Standard Machinery Co., Providence, R. I. (Mechanical Only)

PRESSES—Lead
Robertson, John, Co., Brooklyn, N. Y.

PRESSURE VESSELS—
National Annealing Box Co., Washington, Penna.

PULLERS—Wire
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.

PUMPS—Hydraulic
Robertson, John, Co., Brooklyn, N. Y.

QUENCHING BATH CONTROLS—
Niagara Blower Co., Buffalo, N. Y.

REEL AND TENSION STAND—
Fidelity Machine Co., Philadelphia, Pa.
Moslo Machinery, Inc., Cleveland, Ohio
Robinson Mfg. Co., Muncy, Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Torrington Manufacturing Co., The, Torrington, Conn.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS—Annealing and Stranding
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery, Inc., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Shuster, F. B., Co., New Haven, Conn.
Stevens Metal Products Co., Niles, O.

REELS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS AND SPOOLS—Shipping and Shop
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS—Takeoff
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery, Inc., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Shuster, F. B., Co., New Haven, Conn.
Stevens Metal Products Co., Niles, O.

REELS—Vulcanizing and Impregnating
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Shuster, F. B., Co., New Haven, Conn.
Stevens Metal Products Co., Niles, O.

REELS—Wire Drawing
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery, Inc., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REFRACTORIES—High Temperature
Norton Co., Worcester, Mass.

ROD BAKERS—
Carl-Mayer Corp., The, Cleveland, Ohio
Moslo Machinery, Inc., Cleveland, Ohio
Ross, J. O., Engineering Corp., New York, N. Y.

RODS—Wire—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.

RODS—Wire—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

ROLL STRAIGHTENERS—
Moslo Machinery, Inc., Cleveland, Ohio

RUBBER AND RUBBER COMPRESSION TESTERS—
Scott, Henry L., Co., Providence, R. I.

RUST PROOF COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
American Lanolin Corp., Lawrence, Mass.

RUST REMOVING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.

SHEARS—
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

SHEET—Steel
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.

SOAPS—Industrial and Wire Drawing
Miller, R. H., Co., Homer, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

SPOOLS—Annealing and Wire Drawing
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

SPOOLS—Shipping and Shop
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

SPOOLS—Steel
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

STAMPINGS—Steel
Hubbard Spool Co., Chicago, Ill
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRIP—Brass and Non-Ferrous
Hudson Wire Co., Ossining, N. Y.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.

STRIP METAL TESTERS—
Scott, Henry L., Co., Providence, R. I.

SWIFTS—Take-off
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TANKS—Steel
Mossberg Pressed Steel Corp., Attleboro, Mass.

TEMPERATURE CONTROLS—
Niagara Blower Co., Buffalo, N. Y.

TENSILE TESTERS—
Scott, Henry L., Co., Providence, R. I.

TESTING INSTRUMENTS—
Scott, Henry L., Co., Providence, R. I.

TOOLS—Wire Cutting
Porter, H. K., Inc., Everett, Mass.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TREADS—Safety
Norton Co., Worcester, Mass.

TRUCKS—
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

TUBE BENDERS AND FORMERS—
Ruesch, H. J., Machine Co., Newark, N. J.

TURKS HEADS—Friction and Power Driven
Standard Machinery Co., Providence, R. I.

VULCANIZERS—
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS—
American Insulating Mach'y Co., Phila., Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.

WELDERS—Spot and Butt
Micro Products Co., Chicago, Ill.
Moslo Machinery, Inc., Cleveland, Ohio

WIRE—Cold Heading
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

WIRE DRAWING—High Grade Custom
Hy-Carbo Steel Co., Lowell, Mass.

WIRE—Electric
Hudson Wire Co., Ossining, N. Y.

WIRE—Enameled for Coils
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Manufacturers
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

WIRE—Music
Jersey Steel & Wire Corp., Irvington, N. J.

WIRE—Nickel Silver and Phosphor Bronze
Callite Tungsten Corp., Union City, N. J.
Hudson Wire Co., Ossining, N. Y.

WIRE—Non-Ferrous to Specification for Special Purposes
Callite Tungsten Corp., Union City, N. J.
Hudson Wire Co., Ossining, N. Y.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Spring
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

WIRE—Stainless Steel
Callite Tungsten Corp., Union City, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.

WIRE—Steel—Also Coppered Steel—Also Galvanized Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

WIRE AND STRIP—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

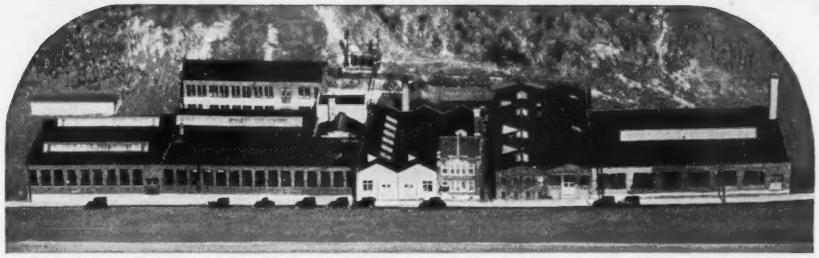
WIRE TESTERS—
Scott, Henry L., Co., Providence, R. I.

WIRE, WEAVING—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.

WRAPPING PAPER—Creped
Crepe-Kraft Co., Newark, N. J.

YARN TESTERS—
Scott, Henry L., Co., Providence, R. I.

HUDCO



HUDSON WIRE CO. PLANT AT OSSINING, N. Y.

This plant is one of the most up-to-date and completely equipped plants in the world for the production of "HUDCO" fine wires in all metals.

ESTABLISHED IN 1902

HUDCO

WIRES FOR METAL SPRAYING

Pure Lead, Lead Alloy, Pure Zinc, Zinc Alloy, Copper, Tin, High Brass, Low Brass, Solder Wire, High Conductivity, Electric Wire. Cadmium, Nickel Silver, Aluminum, Monel Metal, Phosphor Bronze, Pure Nickel, Commercial Bronze, Brush Wires, Crimp and Straight, Brass, Steel, Nickel Silver, Copper and Phosphor Bronze.

HUDCO

FINE BARE WIRES

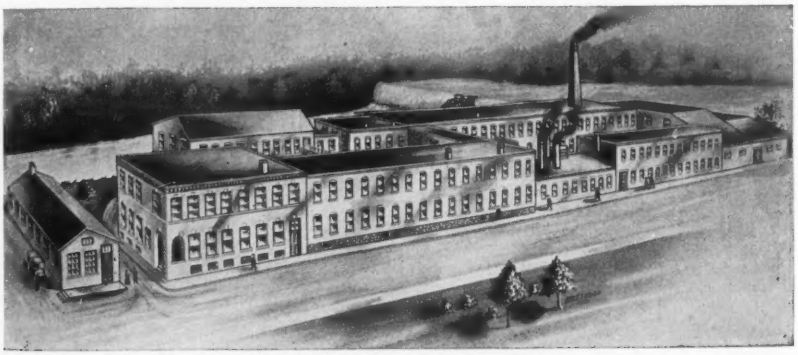
High Brass, Low Brass, Zinc 99.99+ and High Tensile Zinc, Commercial Bronze, Phosphor Bronze, Pure Tin, Lead, Antimonial Lead, Tinsel Lahns, Silver Plated Copper, False Gold and Copper. Cadmium, Nickel Silver, Silver Plated Copper, False Gold and Special Brass and Bronze Alloys to Specification. Metallic Fibre for Packing Purposes, Copper, Bronze, Zinc, Lead and Aluminum.

"HUDCO" specially processed Copper Wire for enamelling purposes is drawn from Selected Copper, insuring the maximum conductivity. This is but one example of the use of the most advanced and approved materials and methods in our processing.

BETTER WIRE AT LOWER COST

Send Us Your Specifications and Let Us Quote Prices

HUDSON WIRE COMPANY • OSSINING, N. Y.



Winsted Division of HUDSON WIRE CO. at Winsted, Conn., modern and completely equipped enamelled wire plant for LEAKPROOF ENAMELLED WIRE and all standard and special coverings.

WINCO

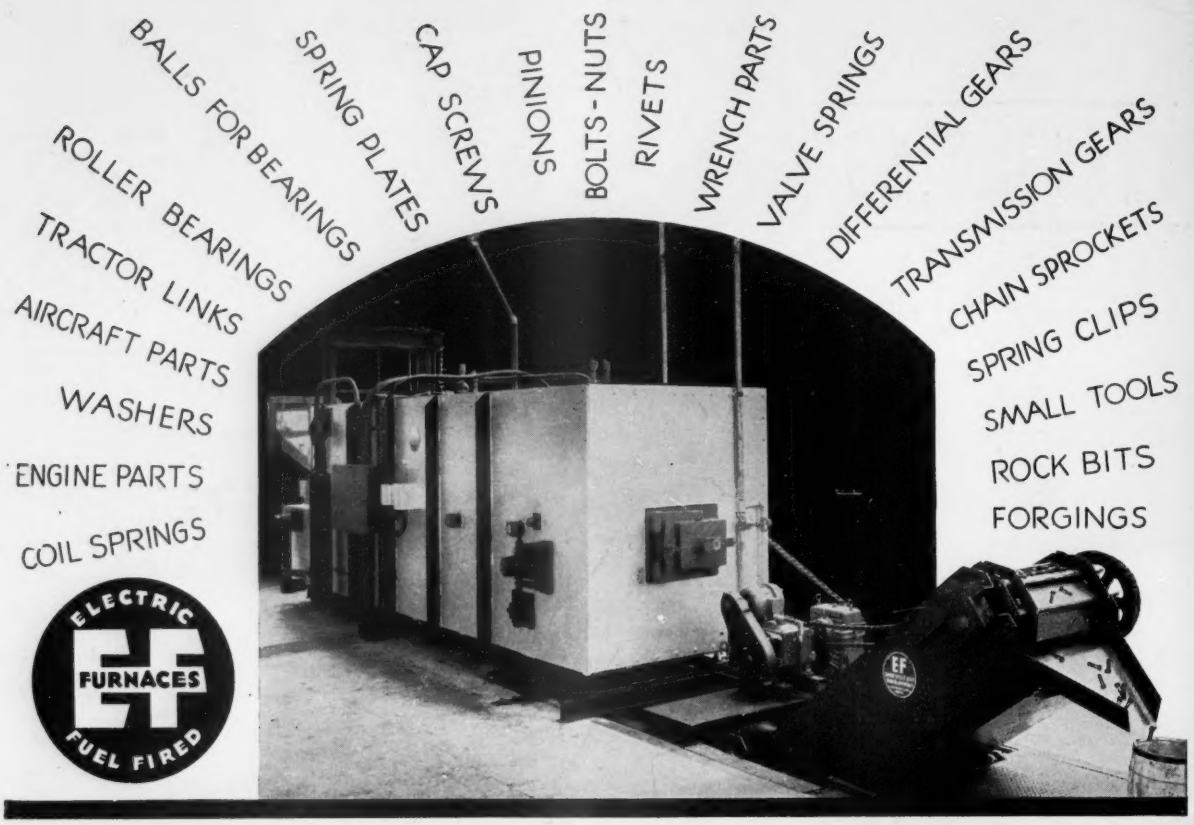
"WINCO" enamelled wire is drawn from special selected copper, assuring perfect enamelling. All wire tested before shipment.

"WINCO" enamelled wire is available in all standard and special coverings made to meet exacting requirements.

Samples of LEAKPROOF and other enamelled wires sent on request

WINSTED DIVISION OF HUDSON WIRE COMPANY

WINSTED, CONN.



For Heat Treating Machine Gun Cartridge Clips,

Bolts, Springs and Miscellaneous Other Parts and Products

--- 300 to 1700 lbs. per Hour

--- Uniformly --- Automatically --- Continuously

E F Continuous Chain Belt Conveyor Type Furnaces are handling all kinds of products, ranging in sizes from small springs and machine gun cartridge clips up to large crawler links for tanks and tractors. Hundreds of these furnaces are in operation, handling such products as listed above.

The material is loaded directly onto rugged heat resisting cast link belt conveyors. Without further attention, it is carried through the furnace, uniformly heated to the proper temperature and automatically discharged through a sealed chute to the quenching medium or directly from the furnace as desired. The chain belt conveyor returns within the furnace without cooling — no pans or trays are used in the furnace — 100% net material.

These furnaces are built for oil, gas or electric heat in five standard sizes with capacities ranging from 300 to 1700 lbs. per hour. Larger or smaller sizes can also be furnished. They are also designed for using special protective atmospheres for scale-free heat treating and hardening without decarburization.

The hundreds of installations in operation, handling all kinds of material. have proven them the most satisfactory and dependable general purpose heat treating machines built for the uniform, economical, production heat treatment of miscellaneous small and medium sized parts and products.

The Chain Belt Conveyor Furnace is only one of the numerous types we build for various heat treating purposes.

Tank armor castings, shell forgings, cartridge cases, bombs and gun parts, aircraft and aircraft engine parts, and many other allied products are being uniformly treated in outstanding production furnaces built by the Electric Furnace Company, Salem, Ohio. We specialize in designing and building production furnaces.

Send for circulars showing these and other types

The Electric Furnace Co., Salem, Ohio

Gas Fired, Oil Fired and Electric Furnaces---For Any Process, Product or Production